Employment Equations in LIFT: Focus on Annual Hours

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LIFT models employment for 85 detailed producing sectors. This paper focuses on one part of employment determination in the model: average annual hours per job. The first section of the paper is a review of the determinants of employment in LIFT, and why we need equations for annual hours by industry. The second section describes a new estimation procedure for the annual hours equations, and the third section describes a forecast with the LIFT model based on the re-estimated equations.

Employment in LIFT: Concepts and Definitions

Defining Industry Employment

There are two main approaches that the U.S. Department of Commerce Bureau of Labor Statistics (BLS) takes when determining the amount of employment in the economy. In the first approach, a household survey, BLS asks individuals whether or not they have a job.[1] This survey yields data on the size of the labor force, the number of people employed, and the number of people unemployed. The definition of total employment in the household survey includes

> *the number of civilian persons in the economy who are employed in one (or more) jobs, either full-time or part-time, including the self-employed and unpaid family workers.*[2]

The household survey is complete in that it provides a measure of the total number of people in the economy who are working. It also is important because it is used to calculate the overall unemployment rate, which is a widely used economic statistic. On the other hand, it is not designed as an industry survey, so it does not provide comprehensive industry detail: are people working in automobile factories, at fast-food restaurants, or clothing stores?

The second approach to measuring employment is an establishment survey. Each month, BLS conducts a survey of a sample of business establishments to determine how many

[1] Data are obtained from a sample survey of the population 16 years of age and over conducted each month by the Bureau of the Census for the BLS. The survey provides data on the labor force, the employed, and the unemployed, including such characteristics as age, sex, race, family relationships, occupation, and industry attachment. The information is collected by trained interviewers from a sample of about 60,000 households, with coverage in 50 states and the District of Columbia. (*Employment and Earnings, Vol. 38, No. 7, July 1991, p. 157.*)

[2] Unpaid family workers are those family members who work more than 15 hours a week in a family-owned business, but who are not on the payroll.

employees were on each establishment's payroll that month.[3] The payroll survey provides detailed industry data on employees, hours worked, and earnings. There are several differences between the establishment and household measures of employment, however, so that summing the payroll data does not give the same measure of total employment as defined by the household survey data.

Two of the main differences between the payroll survey and the household survey measures of employment are (1) how self-employed workers are counted, and (2) how multiple-job holders are counted. The first difference is addressed by BLS with industry-level data. Since the household survey asks individuals whether or not they have a job, it does capture those people who are self-employed. The establishment survey of employment misses those individuals, however. The Office of Employment Projections at BLS estimates self-employed workers and unpaid family workers by detailed industry. The OEP estimates of industry employment therefore equal:

wage and salary jobs ("payroll" employment)
\+ self-employed jobs
\+ unpaid family workers

For each industry, OEP reports wage and salary jobs, and self-employed plus unpaid family worker jobs. In addition, OEP reports total hours worked in wage and salary jobs, and total hours worked in self-employed plus unpaid family worker jobs.[4] When aggregated, the industry estimates of employment more closely follow the definition of employment from the household survey data than does the original payroll survey.

The second difference between the household and establishment surveys of employment is that the establishment survey is not an accurate measure of the number of <u>persons</u> with jobs, since it counts <u>jobs</u>. In other words, the establishment survey does not measure the number of people who hold more than one job. BLS does not attempt to address this difference at the industry level or in the aggregate. INFORUM, however, assumes that the difference between the industry OEP employment and the household survey total employment is due mainly to the number of multiple job holders in the economy. INFORUM therefore calculates the difference between the two employment measures, and calls it the Multiple Job Adjustment (multjb).

INFORUM uses the OEP estimates of industry employment in the LIFT model. LIFT also

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[3] The establishment survey is designed to provide industry information on nonfarm wage and salary employment, average weekly hours, average hourly earnings, and average weekly earnings. The employment, hours, and earnings are based on payroll reports from a sample of over 350,000 establishments, employing over 41 million workers. The form used is BLS-790, Report on Employment, Payroll, and Hours. (*Employment and Earnings, p. 157, p. 174.*) This establishment survey data is benchmarked annually to another source of industry employment data: the unemployment insurance reports (ES-202 data).

[4] The OEP data also includes production worker jobs and hours, which are a subset of wage and salary jobs. The hours data differ from hours reported in the BLS Employment, Hours, and Earnings (EHE) data, in that OEP estimates hours for supervisory workers. Hours from EHE are hours for production workers and non-supervisory workers only.

includes a forecast of the multiple job adjustment, to convert total industry jobs into a measure of the total number of persons employed. (This forecast is an exogenous fix, and is based on past trends in the adjustment.) The final part of determining the total employment picture is to calculate the number of persons in the labor force who are unemployed and the unemployment rate. The calculations of employment in LIFT are summarized in Table 1.

Table 1: Employment Aggregates in LIFT

		LIFT Name
	Sum of industry employment (total civilian jobs)	LFT*
-	Adjustment for persons holding multiple jobs	MULTJB
=	Total number of persons employed	(LFT-MULTJB)
	Number of persons in labor force	LFC
-	Total number of persons employed	(LFT-MULTJB)
=	Total number of persons unemployed	UNEMP
	Unemployment rate	UN
=	100*(persons unemployed/persons in labor force)	

* LFT equals Total Private-sector jobs, ENF, (Total industry jobs plus rest of world jobs plus domestic servant jobs) plus non-military government jobs.

Employment Determination in LIFT

The demand for labor is determined partly by industry output: as output increases, more labor is required. However, employment depends on labor productivity: how much output can be produced for each hour worked. The main workhorse in determining industry employment in LIFT are equations that determine labor productivity by industry.[5] Productivity is defined as output per hour worked since that is a more accurate measure of worker productivity than output per worker. Output per hour adjusts for occasions when workers put in overtime hours, and for the fact that some employees are part-time.[6] At the industry level, Inforum uses data on average hours worked per job to convert total hours into jobs. The equations that determine the average hours worked per job are the subject of this paper.

[5] These equations are described in detail elsewhere, see Griffiths, for example. The equations use trends and changes in output, and reflect the fact that the influence of demand changes is not symmetric over the business cycle. Labor hoarding occurs at the beginning of a downturn, implying that measured productivity falls, while hiring increases very slowly at the beginning of a recovery.

[6] If two firms each produce $100 worth of output in a regular 40-hour work week they have the same labor productivity. However, if firm A uses 1 full-time employee and firm B uses two half-time employees, labor productivity measured as output per worker would be twice as high for Firm A.

To be specific, the following equations, identities, and variables are used in calculating industry employment in LIFT. Labor productivity is determined using equations; output divided by productivity gives total hours worked. Average annual hours (hours worked per job per year) then are determined by equations. Dividing total hours worked by hours worked per job gives total jobs, or employment. (See Table 2.)

Table 2: Industry Employment in LIFT

Concept	Definition	LIFT name	How determined in LIFT
Labor productivity	output (77$) / total hours worked	PRD	equations time trends, increases in output, decreases in output
Total hours worked	output / productivity	HRS	identity
Annual hours per job	hours worked / number of jobs	YHR	equations time trends, changes* in output
Number of jobs	hours worked / annual hours per job	EMP	identity

* equations as of 12/93

Average Annual (Weekly) Hours Per Job

As shown in Tables 1 and 2, average annual hours help determine the number of jobs by industry in LIFT, and therefore total employment and the unemployment rate. For example, with identical labor productivity and total number of hours worked, a lower level of hours per job implies more jobs (and a lower unemployment rate) than a higher level of hours per job. An increase in annual hours that implies a 35-hour work week versus a 34-hour work week causes a half of a percentage point increase in the unemployment rate, from 4.5 to 5.0 percent.[7]

A technical point should be noted here. The variable used in LIFT is average annual hours per job. Dividing annual hours by 52 weeks gives average weekly hours per job. Since a 40-hour work week is a relatively familiar concept, weekly hours will be used in most illustrations in this paper, and the equations will be estimated for weekly hours.

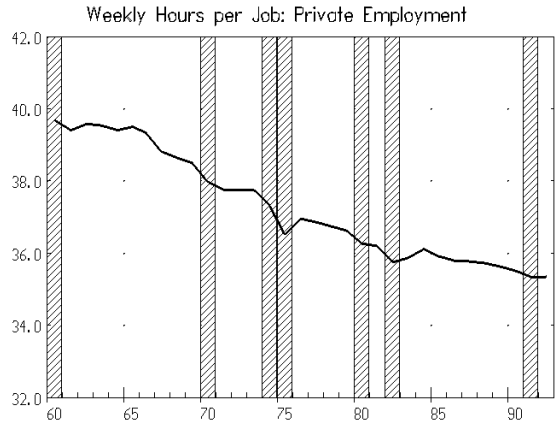
As shown in Figure 1, average weekly hours have both a trend and a cyclical component. For the past three decades, average weekly hours of total private employment have declined from close to 40 hours in 1960, to 35.5 hours in 1992. As shown in Figure 2, the downward trend in total hours has come from the non-manufacturing sector. Service jobs have lower average weekly hours than manufacturing jobs, and as services have become a larger share of the economy, total weekly hours have declined. In addition, weekly hours in non-manufacturing have been declining since 1960. While hours have declined sharply in the non-manufacturing sector,

[7] This result is taken from a test simulation done with newly estimated average annual hours equations.

the average work week has remained relatively constant in manufacturing. In fact, manufacturing hours are slightly higher in the 1982-1992 decade than in the prior decade. In both manufacturing and non-manufacturing, there is a change in the trend of average hours beginning in the early 1980's. In non-manufacturing, the downward trend in hours flattens out; hours have not declined as quickly since 1980 as they did from 1960 to 1980. As noted for manufacturing, average hours have risen slightly in the 1980-1992 period.

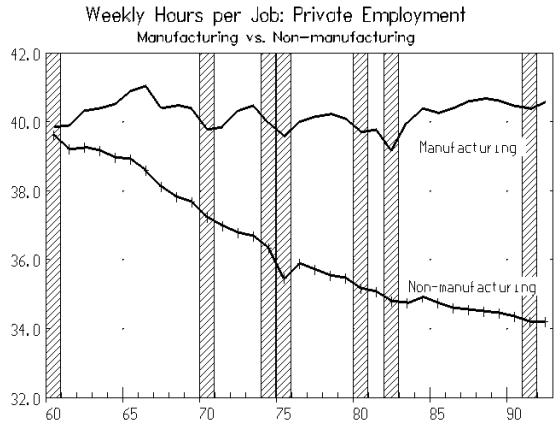
The cyclical nature of weekly hours is most evident in the manufacturing sector. During a recession, average weekly hours decrease. Conversely, as the economy strengthens, average weekly hours usually increase, as firms increase over-time hours to meet increasing demand. When firms are confident that a recovery is underway, hours may again drop off, as new workers are hired to fill the increase in demand, and fewer overtime hours are required of existing employees.

Figure 1



Source: BLS Office of Economic Projections

Figure 2



Source: BLS Office of Economic Projections

The equations used in LIFT as of December 1993 for average yearly hours were based on capturing the trend component of hours, using time trends, and the cyclical component, using industry changes in output. When projected fifteen years, the equations based on a linear trend

often show continued declines in average hours.[8] In addition, the trend dominates any cyclical activity evident in hours. The goal of this work was to try to improve the hours equations in those two respects: improve the trend pattern and improve the cyclical sensitivity of average hours.

Estimating Equations for Average Weekly Hours

The bulk of this paper focuses on equations for the sixteen largest employing sectors of the 85 sectors in LIFT. (The top sixteen sectors account for 75 percent of total jobs in the private sector of the economy. See Table 3.) The first problem that was addressed was the forecast of a strong negative trend for many sectors. Instead of using a linear time trend, changes in labor force trends were used to explain the trends in weekly hours. In early attempts to re-estimate equations for weekly hours, a second approach was attempted, that used a non-linear time trend instead of the linear trend. The nonlinear trend used was the inverse of time, which had the advantage of capturing the change in the overall pattern for weekly hours that begins in the 1980s.[9]

Table 3: Employment - Thousands of Jobs

Top 16 Employment Sectors in LIFT:
Ranked by Average Employment 1990–1992

Rank	Sector Title & Number	1990	1991	1992
1	Retail trade (60)	14425.8	14132.6	13977.8
2	Business services (66)	10024.2	9976.5	10127.4
3	Eating and drinking (61)	6785.1	6764.7	6873.3
4	Wholesale trade (59)	6519.0	6441.5	6403.7
5	Construction (8)	6616.8	6122.1	5969.1
6	Education npo (69)	5939.4	6155.5	6393.3
7	Finance and insurance (62)	5652.0	5603.4	5547.5
8	Hotels (65)	4404.1	4391.5	4086.3
9	Private hospitals (82)	3554.7	3659.1	3768.8
10	Agriculture (1)	3276.0	3320.0	3295.1
11	Trucking (50)	2418.5	2429.5	2457.9
12	Dentists, chiropractors, (84)	1715.7	1834.1	1945.2
13	Food and tobacco (9)	1730.6	1742.0	1725.6
14	Real estate (63)	1709.0	1672.5	1669.8
15	Printing (14)	1674.4	1630.7	1587.9
16	Physicians (83)	1541.5	1619.7	1685.4
	TOTAL Employment (jobs)	104668.4	103580.4	103266.9
	Top 16 as percent of Total	74.5%	74.8%	75.1%

[8] In some cases, the equation results were over-ridden in the model using fixes. For the December 1993 INFORUM meeting forecast, for instance, average annual hours for three sectors were over-ridden: Retail trade, Eating and drinking places, and Movies and amusements.

[9] Using the inverse of time introduces a "non-uniqueness" problem, in the sense that the equation will be sensitive to the starting value of time. Although the equations estimated with the inverse of time fit extremely well, the equations were estimated using a variable with more economic meaning than a time trend, namely, the labor-force participation.

In general, as labor force participation increases, the length of the average work week declines: with more workers there is less need for overtime hours per worker, and an increase in part-time jobs. The impact on the length of the work week depends, however, on the type of workers entering the labor force. Teenage workers and females historically have been more likely to take lower-paying, often part-time work, available largely in the service sector. As the participation rates for teens and females increased from 1960 to 1980, the length of the average work week fell, especially in non-manufacturing. However, since 1980, the participation rates for both teens and females have slowed. As these rates have slowed, the decline in the length of the work week also has slowed. Clearly, some measure of labor force participation rates should help explain the changes in trends in average hours. Although LIFT does not specify labor force by type, an overall measure of labor-force participation can be constructed as the ratio of the labor force to total population. This ratio captures the slowdown in the rate of increase in labor force participation of females and teens since 1980, and helps explain the changing trends in average weekly hours. (The ratio of labor force to working age population also was tried, but the fit of the equations was greatly improved by using the labor force to total population ratio.)

The second problem that was addressed in this re-estimation of the equations was the lack of cyclical response by most of the sectoral equations. To add more cyclical response to the equations, the unemployment rate was tried in place of the percent change in industry output, and in some cases, in addition to the output variable.

Figure 3 illustrates the effects of using the labor-force trend by showing a sample sector, Retail trade. The original equation is shown, as well as the new equation. The two graphs show the regression fit of the two equations, as well as a "static" forecast using the estimated equation.[10] Because average hours in Retail trade have been declining since 1965, the equation with a linear time trend shows a continued sharp decline in hours through the year 2010. Closer examination of hours in Retail trade shows that the sharp decline in hours from 1965 to 1980 has been followed by a period of more slowly declining hours. The equation using labor force participation captures this leveling out in the decline of hours, and the static forecast seems to be more reasonable than the first equation. Because weekly hours in Retail trade are not very cyclical in nature, the change in output and the unemployment rate do not have a large affect on the equation. Since the signs on the variables are correct, they are left in the equation.

A sector with more cyclical weekly hours is shown in Figure 4, Wholesale trade. The equation for Wholesale trade uses labor-force participation and the current unemployment rate. As with Retail trade, the equation with a linear time trend misses the flattening out in weekly hours that has occurred in Wholesale trade since 1975. The forecast for weekly hours with the linear trend equation therefore shows continued declines in weekly hours. The equation using labor-force participation more closely captures the flattening out in hours since 1975, and projects a much more moderate decline in hours through the forecast period.

The second change to the Wholesale trade equation involved capturing the cyclical response of hours. The change in industry output did not significantly help the regression fit of the

[10] The forecast is "static" in that there is no feedback from hours to other variables: the forecast is calculated using LIFT forecasts of the independent variables. (In this case, the labor force, population, and the percent change in Retail trade output.)

equation, so the unemployment rate was used instead. The unemployment rate has the expected negative effect on hours, and it greatly improves the fit of the equation.

Figure 3: Average Weekly Hours for Retail Trade (60)

```
title 60 Retail trade: Weekly Hours / Job

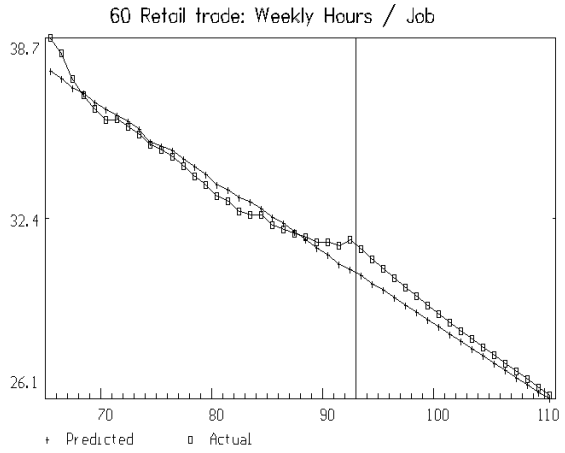
r wkh60 = time,dout

:                    60 Retail trade: Weekly Hours / Job                                  Linear Trend Equation
  SEE   =       0.45 RSQ   = 0.9551 RHO =   0.90 Obser  =   28 from 1965.000
  SEE+1 =       0.29 RBSQ  = 0.9515 DW  =   0.20 DoFree =   25 to   1992.000
  MAPE  =       1.02
    Variable name           Reg-Coef  Mexval t-value  Elas   NorRes     Mean
  0 wkh60                 - - - - - - - - - - - - - - - - - - - - -     34.06
  1 intercept               39.47479  2631.5 136.484   1.16   22.25      1.00
  2 time                    -0.25400   358.5 -22.372  -0.16    1.01     21.50
  3 dout                     0.01828     0.7   0.588   0.00    1.00      2.72



:                    60 Retail trade: Weekly Hours / Job                                   Labor Force Equation
  SEE   =       0.35 RSQ   = 0.9727 RHO =   0.81 Obser  =   28 from 1965.000
  SEE+1 =       0.29 RBSQ  = 0.9693 DW  =   0.38 DoFree =   24 to   1992.000
  MAPE  =       0.67
    Variable name           Reg-Coef  Mexval t-value  Elas   NorRes     Mean
  0 wkh60                 - - - - - - - - - - - - - - - - - - - - -     34.06
  1 intercept               57.21615  1222.7  64.611   1.68   36.65      1.00
  2 lfcpt                   -0.50990   367.5 -22.372  -0.67    1.05     45.02
  3 un                      -0.04381     1.2  -0.745  -0.01    1.03      5.87
  4 dout                     0.02199     1.6   0.890   0.00    1.00      2.72
```

Linear Trend Equation



Labor Force Equation

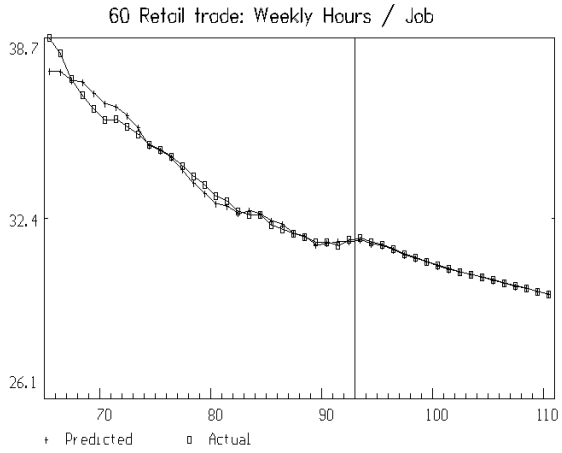


Figure 4: Average Weekly Hours for Wholesale Trade (59)

```
title 59 Wholesale trade: Weekly Hours / Job

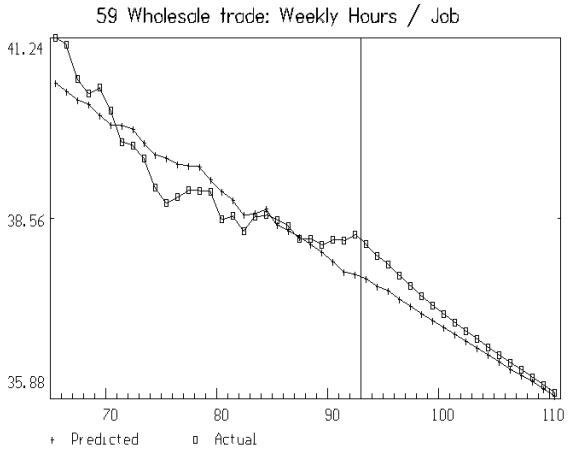
r wkh59 = time,dout

:                    59 Wholesale trade: Weekly Hours / Job                          Linear Trend Equation
  SEE   =       0.36 RSQ   = 0.8455 RHO =   0.88 Obser  =   28 from 1965.000
  SEE+1 =       0.21 RBSQ  = 0.8331 DW  =   0.25 DoFree =   25 to   1992.000
  MAPE  =       0.77
    Variable name           Reg-Coef  Mexval t-value  Elas   NorRes     Mean
  0 wkh59                 - - - - - - - - - - - - - - - - - - - - -     39.12
  1 intercept               41.21516  2989.4 154.391   1.05    6.47      1.00
  2 time                    -0.10119   133.6 -10.558  -0.06    1.03     21.50
  3 dout                     0.02034     1.5   0.866   0.00    1.00      4.10

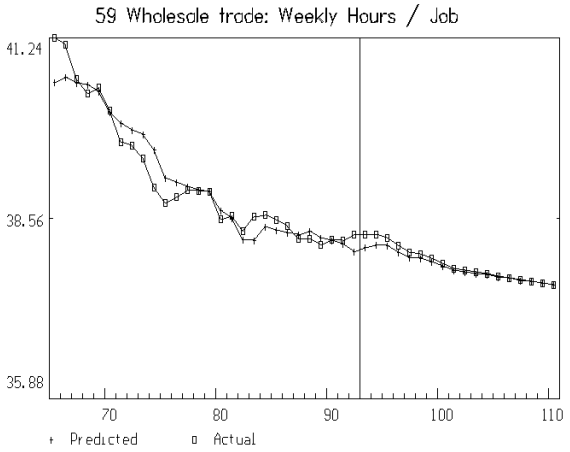

r wkh59 = lfcpt,un

:                    59 Wholesale trade: Weekly Hours / Job                           Labor Force Equation
  SEE   =       0.25 RSQ   = 0.9247 RHO =   0.79 Obser  =   28 from 1965.000
  SEE+1 =       0.19 RBSQ  = 0.9187 DW  =   0.42 DoFree =   25 to   1992.000
  MAPE  =       0.47
    Variable name           Reg-Coef  Mexval t-value  Elas   NorRes     Mean
  0 wkh59                 - - - - - - - - - - - - - - - - - - - - -     39.12
  1 intercept               48.35781  1511.6  80.427   1.24   13.29      1.00
  2 lfcpt                   -0.18783   157.4 -11.859  -0.22    1.41     45.02
  3 un                      -0.13270    18.7  -3.194  -0.02    1.00      5.87
```

Linear Trend Equation



Labor Force Equation



The equation results for the remaining 14 of the top 16 sectors are shown in Figure 5. These results are all quite similar to the examples discussed here. The labor force participation rate is used in place of a linear time trend, and an effort was made to improve the cyclical properties of the equations by including the unemployment rate in the equations. Table 4, following Figure 5, lists the equation results for all 85 sectors in LIFT.

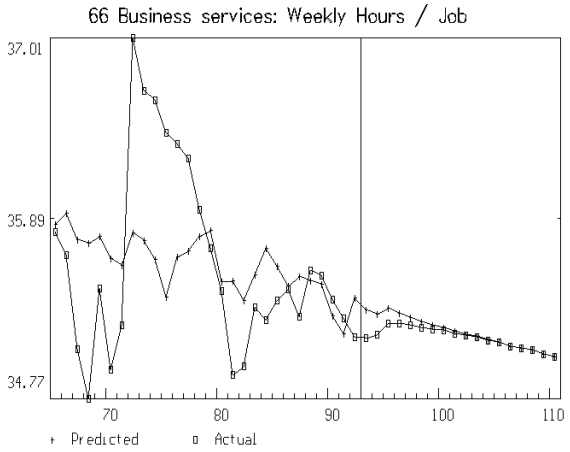
Figure 5: Average Weekly Hours for Large Employment Sectors

```
add hrsg.reg  66 "Business services"
mode f
f yhr66 = hrs66/emp66
f dout  = (out66/out66[1]-1.0)*100
f pclfc = (lfc/lfc[1]-1.0)*100
f lfcpt = (lfc/pt)/10
f wkh66 = (yhr66/52)*1000.

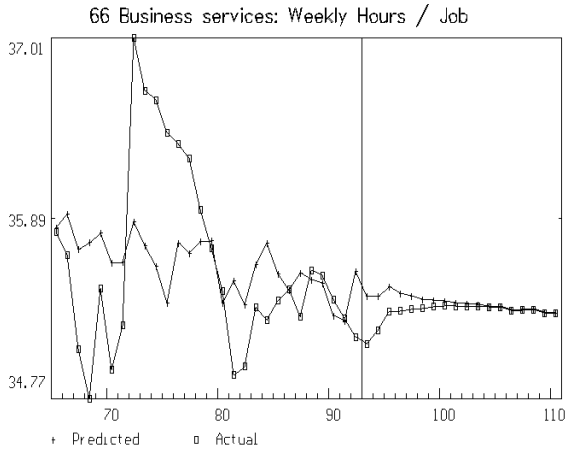
title 66 Business services: Weekly Hours / Job
r wkh66 = time,dout
:                  66 Business services: Weekly Hours / Job
  SEE   =       0.55 RSQ   = 0.0959 RHO =   0.72 Obser  =   28 from 1965.000
  SEE+1 =       0.38 RBSQ  = 0.0236 DW  =   0.56 DoFree =   25 to   1992.000
  MAPE  =       1.18
    Variable name           Reg-Coef  Mexval t-value  Elas   NorRes     Mean
  0 wkh66                 - - - - - - - - - - - - - - - - - - - - -     35.60
  1 intercept               35.78809  1930.2 101.388   1.01    1.11      1.00
  2 time                    -0.01612     2.8  -1.190  -0.01    1.04     21.50
  3 dout                     0.03374     2.2   1.045   0.00    1.00      4.69
gr *
f oldeq = depvar

r wkh66 = lfcpt,dout,dout[1]
:                  66 Business services: Weekly Hours / Job
  SEE   =       0.55 RSQ   = 0.0919 RHO =   0.72 Obser  =   28 from 1965.000
  SEE+1 =       0.38 RBSQ  = -0.0217 DW  =   0.57 DoFree =   24 to   1992.000
  MAPE  =       1.17
    Variable name           Reg-Coef  Mexval t-value  Elas   NorRes     Mean
  0 wkh66                 - - - - - - - - - - - - - - - - - - - - -     35.60
  1 intercept               36.79967   494.4  28.702   1.03    1.10      1.00
  2 lfcpt                   -0.02945     2.3  -1.048  -0.04    1.06     45.02
  3 dout                     0.03966     2.8   1.158   0.01    1.01      4.69
  4 dout[1]                 -0.01280     0.3  -0.374  -0.00    1.00      4.70
```

Linear Trend Equation



Labor Force Equation

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a d
d

hrsh.reg  61 "Eating and drinking"
mode f
f yhr61 = hrs61/emp61
f dout  = (out61/out61[1]-1.0)*100
f pclfc = (lfc/lfc[1]-1.0)*100

f lfcpt = (lfc/pt)/10
```

```
f wkh61 = (yhr61/52)*1000.
title 61 Eating and drinking: Weekly Hours / Job

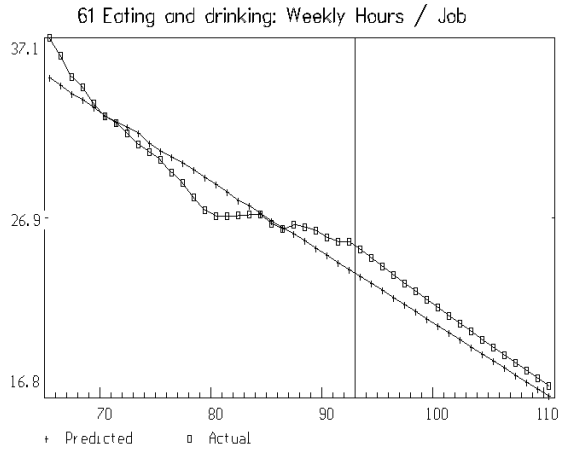

r wkh61 = time,dout

:                 61 Eating and drinking: Weekly Hours / Job
  SEE   =       1.05 RSQ   = 0.9032 RHO =   0.95 Obser  =   28 from 1965.000
  SEE+1 =       0.55 RBSQ  = 0.8955 DW  =   0.11 DoFree =   25 to   1992.000
  MAPE  =       2.96
    Variable name           Reg-Coef  Mexval t-value  Elas   NorRes     Mean
  0 wkh61                - - - - - - - - - - - - - - - - - - - - -     29.36
  1 intercept              37.87672  1065.7  58.073   1.29   10.33      1.00
  2 time                   -0.39718   210.8 -14.716  -0.29    1.00     21.50
  3 dout                    0.01178     0.1   0.233   0.00    1.00      2.17
gr *
f oldeq = depvar

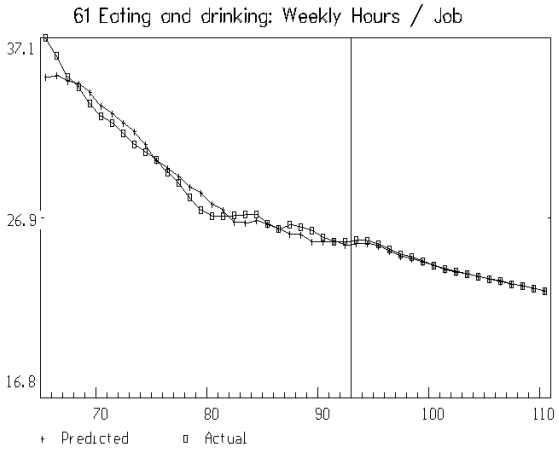

r wkh61 = lfcpt,un

:                 61 Eating and drinking: Weekly Hours / Job
  SEE   =       0.65 RSQ   = 0.9634 RHO =   0.80 Obser  =   28 from 1965.000
  SEE+1 =       0.54 RBSQ  = 0.9604 DW  =   0.39 DoFree =   25 to   1992.000
  MAPE  =       1.63
    Variable name           Reg-Coef  Mexval t-value  Elas   NorRes     Mean
  0 wkh61                - - - - - - - - - - - - - - - - - - - - -     29.36
  1 intercept              65.86019   756.0  42.508   2.24   27.29      1.00
  2 lfcpt                  -0.78046   295.3 -19.123  -1.20    1.19     45.02
  3 un                     -0.23194     9.0  -2.167  -0.05    1.00      5.87
gr *
```

Linear Trend Equation



Labor Force Equation




```
vr 37.88
add hrsf.reg   8 "Construction"
mode f
f yhr8 = hrs8/emp8
f dout  = (out8/out8[1]-1.0)*100
f pclfc = (lfc/lfc[1]-1.0)*100

f lfcpt = (lfc/pt)/10

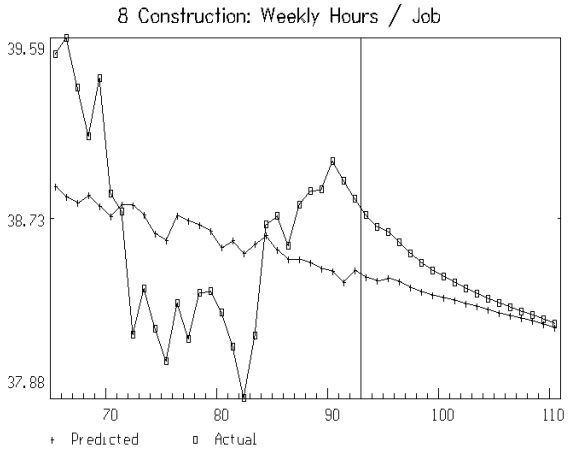
f wkh8 = (yhr8/52)*1000.
title 8 Construction: Weekly Hours / Job
r wkh8 = time,dout

:                    8 Construction: Weekly Hours / Job
  SEE   =       0.44 RSQ   = 0.0740 RHO =   0.86 Obser  =   28 from 1965.000
  SEE+1 =       0.25 RBSQ  = -0.0001 DW  =   0.28 DoFree =   25 to   1992.000
  MAPE  =       1.02
    Variable name           Reg-Coef  Mexval t-value  Elas   NorRes     Mean
  0 wkh8                 - - - - - - - - - - - - - - - - - - - - -     38.66
  1 intercept              38.94647  2898.0 149.816   1.01    1.08      1.00
  2 time                   -0.01412     3.3  -1.288  -0.01    1.01     21.50
  3 dout                    0.00817     0.3   0.409   0.00    1.00      2.10
gr *
f oldeq = depvar
```

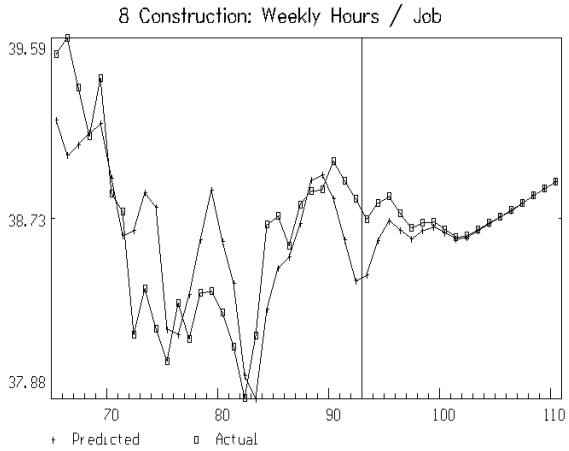
```
r wkh8 = lfcpt,un,un[1]

:                    8 Construction: Weekly Hours / Job
  SEE   =       0.30 RSQ   = 0.5682 RHO =   0.68 Obser  =   28 from 1965.000
  SEE+1 =       0.23 RBSQ  = 0.5142 DW  =   0.65 DoFree =   24 to   1992.000
  MAPE  =       0.66
    Variable name           Reg-Coef  Mexval t-value  Elas   NorRes     Mean
  0 wkh8                  - - - - - - - - - - - - - - - - - - - - -     38.66
  1 intercept               39.11475   930.9  50.265   1.01    2.32      1.00
  2 lfcpt                    0.02398     2.7   1.148   0.03    2.01     45.02
  3 un                      -0.19486    19.5  -3.210  -0.03    1.07      5.87
  4 un[1]                   -0.06957     3.6  -1.322  -0.01    1.00      5.61
gr *
```

Linear Trend Equation



Labor Force Equation



```
vr 29.18
lim 77 92 110
add hrsf.reg  69 "Education npo"
mode f
f yhr69 = hrs69/emp69
f dout  = (out69/out69[1]-1.0)*100
f pclfc = (lfc/lfc[1]-1.0)*100

f lfcpt = (lfc/pt)/10

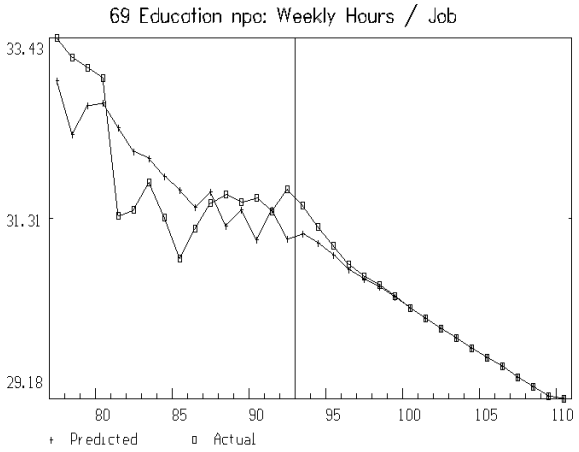
f wkh69 = (yhr69/52)*1000.
title 69 Education npo: Weekly Hours / Job
r wkh69 = time,dout

:                   69 Education npo: Weekly Hours / Job
  SEE   =       0.54 RSQ   = 0.5305 RHO =   0.57 Obser  =   16 from 1977.000
  SEE+1 =       0.46 RBSQ  = 0.4582 DW  =   0.86 DoFree =   13 to   1992.000
  MAPE  =       1.45
    Variable name           Reg-Coef  Mexval t-value  Elas   NorRes     Mean
  0 wkh69                 - - - - - - - - - - - - - - - - - - - - - -     31.85
  1 intercept               35.40710   947.2  37.586   1.11    2.13      1.00
  2 time                    -0.11431    39.2  -3.489  -0.10    1.12     27.50
  3 dout                    -0.09934     5.6  -1.225  -0.01    1.00      4.18
gr *
f oldeq = depvar

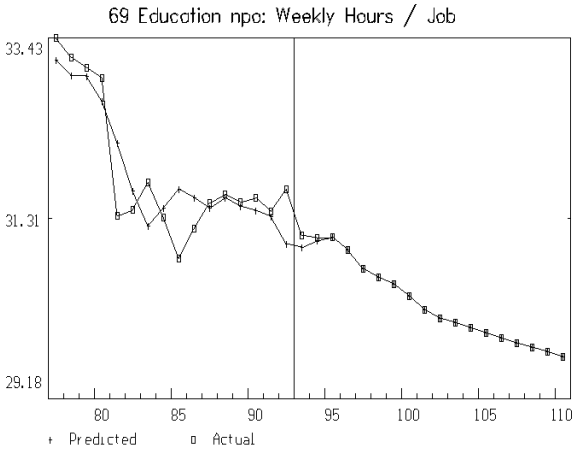

r wkh69 = lfcpt,un,un[1]

:                   69 Education npo: Weekly Hours / Job
  SEE   =       0.39 RSQ   = 0.7523 RHO =   0.22 Obser  =   16 from 1977.000
  SEE+1 =       0.39 RBSQ  = 0.6903 DW  =   1.56 DoFree =   12 to   1992.000
  MAPE  =       0.93
    Variable name           Reg-Coef  Mexval t-value  Elas   NorRes     Mean
  0 wkh69                 - - - - - - - - - - - - - - - - - - - - - -     31.85
  1 intercept               56.52674   306.5  13.647   1.77    4.04      1.00
  2 lfcpt                   -0.46465    94.9  -5.795  -0.70    1.81     48.14
  3 un                      -0.17731     8.0  -1.413  -0.04    1.15      6.55
  4 un[1]                   -0.17500     7.3  -1.352  -0.04    1.00      6.56
gr *
```

Linear Trend Equation



Labor Force Equation



```
vr 35.72
add hrsh.reg  62 "Finance and insurance"
mode f
f yhr62 = hrs62/emp62
f dout  = (out62/out62[1]-1.0)*100
f pclfc = (lfc/lfc[1]-1.0)*100

f lfcpt = (lfc/pt)/10

f wkh62 = (yhr62/52)*1000.
title 62 Finance and insurance: Weekly Hours / Job

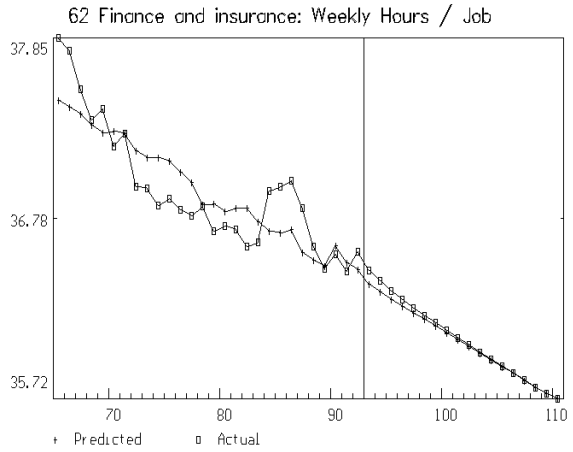

r wkh62 = time,dout

:                62 Finance and insurance: Weekly Hours / Job
  SEE   =       0.19 RSQ   = 0.7244 RHO =   0.77 Obser  =   28 from 1965.000
  SEE+1 =       0.14 RBSQ  = 0.7024 DW  =   0.46 DoFree =   25 to   1992.000
  MAPE  =       0.44
    Variable name           Reg-Coef  Mexval t-value  Elas   NorRes     Mean
  0 wkh62                 - - - - - - - - - - - - - - - - - - - - -     36.95
  1 intercept               37.86044  5329.2 271.412   1.02    3.63      1.00
  2 time                    -0.03984    87.3  -7.920  -0.02    1.05     21.50
  3 dout                    -0.01599     2.7  -1.160  -0.00    1.00      3.64
gr *
f oldeq = depvar

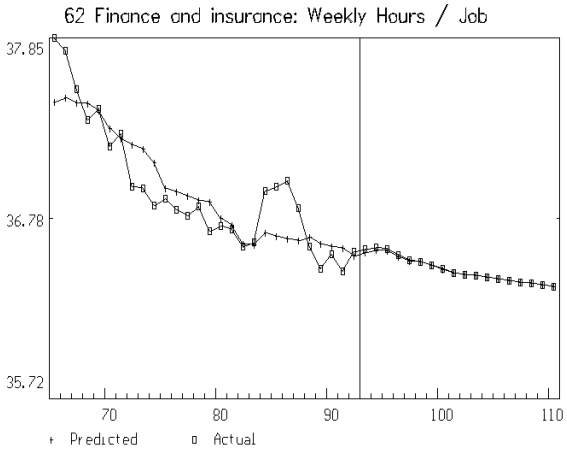

r wkh62 = lfcpt,un

:                62 Finance and insurance: Weekly Hours / Job
  SEE   =       0.17 RSQ   = 0.7737 RHO =   0.72 Obser  =   28 from 1965.000
  SEE+1 =       0.13 RBSQ  = 0.7556 DW  =   0.56 DoFree =   25 to   1992.000
  MAPE  =       0.36
    Variable name           Reg-Coef  Mexval t-value  Elas   NorRes     Mean
  0 wkh62                 - - - - - - - - - - - - - - - - - - - - -     36.95
  1 intercept               40.29218  1860.1  97.878   1.09    4.42      1.00
  2 lfcpt                   -0.06830    60.8  -6.298  -0.08    1.11     45.02
  3 un                      -0.04627     5.2  -1.627  -0.01    1.00      5.87
gr *
```

Linear Trend Equation



Labor Force Equation



```
vr 27.3
# add hrse.reg   65 "Hotels and repair services"
add hrsi.reg   65 "Hotels and repair services"
mode f
f yhr65 = hrs65/emp65
f dout  = (out65/out65[1]-1.0)*100
f pclfc = (lfc/lfc[1]-1.0)*100

f lfcpt = (lfc/pt)/10

f wkh65 = (yhr65/52)*1000.
title 65 Hotels and repair services: Weekly Hours / Job

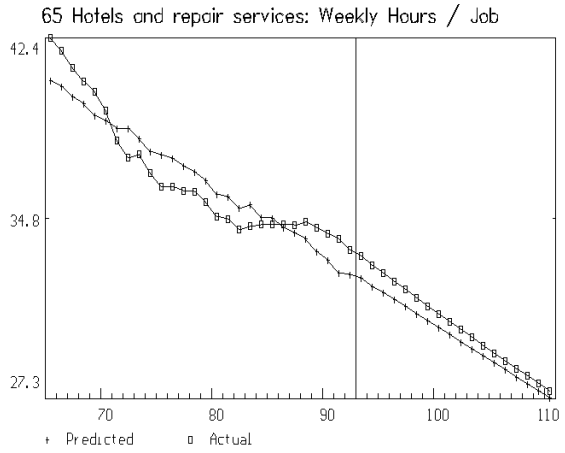

r wkh65 = time,dout

:             65 Hotels and repair services: Weekly Hours / Job
  SEE   =       0.98 RSQ   = 0.8537 RHO =   0.93 Obser  =   28 from 1965.000
  SEE+1 =       0.49 RBSQ  = 0.8420 DW  =   0.13 DoFree =   25 to   1992.000
  MAPE  =       2.46
    Variable name           Reg-Coef  Mexval t-value  Elas   NorRes     Mean
  0 wkh65                 - - - - - - - - - - - - - - - - - - - - -     36.51
  1 intercept               42.77559  1418.9  75.779   1.17    6.84      1.00
  2 time                    -0.29393   161.1 -12.059  -0.17    1.02     21.50
  3 dout                     0.05047     1.1   0.760   0.00    1.00      1.14
gr *
f oldeq = depvar

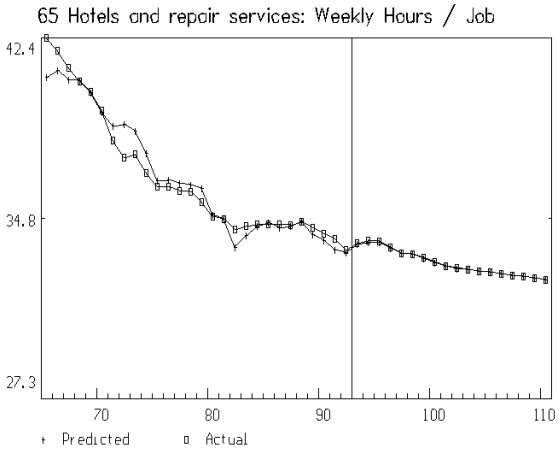

r wkh65 = lfcpt,un,dout

:             65 Hotels and repair services: Weekly Hours / Job
  SEE   =       0.58 RSQ   = 0.9495 RHO =   0.77 Obser  =   28 from 1965.000
  SEE+1 =       0.46 RBSQ  = 0.9432 DW  =   0.46 DoFree =   24 to   1992.000
  MAPE  =       1.08
    Variable name           Reg-Coef  Mexval t-value  Elas   NorRes     Mean
  0 wkh65                 - - - - - - - - - - - - - - - - - - - - -     36.51
  1 intercept               62.40292   808.0  44.213   1.71   19.81      1.00
  2 lfcpt                   -0.52285   202.3 -13.977  -0.64    1.91     45.02
  3 un                      -0.41176    31.5  -4.184  -0.07    1.09      5.87
  4 dout                     0.05813     4.3   1.443   0.00    1.00      1.14
gr *
```

Linear Trend Equation



Labor Force Equation



```
vr off
lim 77 92 110
add hrse.reg   82 "Private hospitals"
mode f
f yhr82 = hrs82/emp82
f dout  = (out82/out82[1]-1.0)*100
f pclfc = (lfc/lfc[1]-1.0)*100

f lfcpt = (lfc/pt)/10

f wkh82 = (yhr82/52 )* 1000.

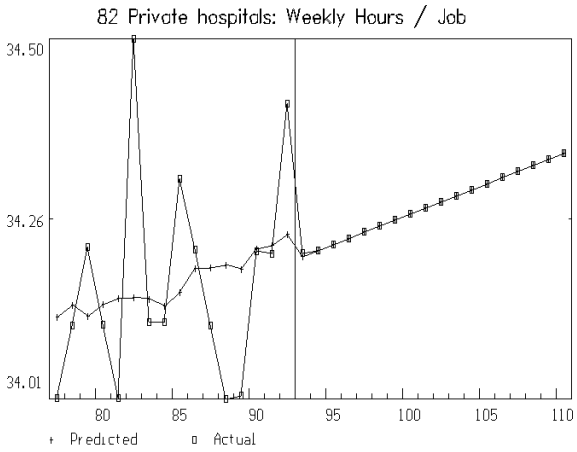

title 82 Private hospitals: Weekly Hours / Job
r wkh82 = time,dout

:                  82 Private hospitals: Weekly Hours / Job
  SEE   =       0.14 RSQ   = 0.0626 RHO =   0.03 Obser  =   16 from 1977.000
  SEE+1 =       0.14 RBSQ  = -0.0817 DW  =   1.95 DoFree =   13 to   1992.000
  MAPE  =       0.30
    Variable name           Reg-Coef  Mexval t-value  Elas   NorRes     Mean
  0 wkh82                 - - - - - - - - - - - - - - - - - - - - -     34.17
  1 intercept               33.90322  2895.0 107.927   0.99    1.07      1.00
  2 time                     0.00835     3.3   0.927   0.01    1.01     27.50
  3 dout                     0.00927     0.3   0.302   0.00    1.00      3.68
gr *
f oldeq = depvar

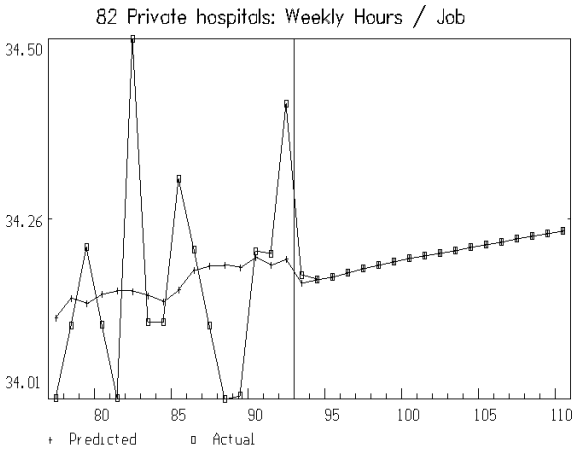

r wkh82 = lfcpt,dout

:                  82 Private hospitals: Weekly Hours / Job
  SEE   =       0.14 RSQ   = 0.0310 RHO =   0.05 Obser  =   16 from 1977.000
  SEE+1 =       0.14 RBSQ  = -0.1180 DW  =   1.89 DoFree =   13 to   1992.000
  MAPE  =       0.31
    Variable name           Reg-Coef  Mexval t-value  Elas   NorRes     Mean
  0 wkh82                 - - - - - - - - - - - - - - - - - - - - -     34.17
  1 intercept               33.23019   529.3  22.401   0.97    1.03      1.00
  2 lfcpt                    0.01887     1.6   0.640   0.03    1.00     48.14
  3 dout                     0.00778     0.2   0.238   0.00    1.00      3.68
gr *
```

Linear Trend Equation



Labor Force Equation



```
vr 40.85
add hrsi.reg  1 "Agriculture"
mode f
f yhr1 = hrs1/emp1
f dout  = (out1/out1[1]-1.0)*100
f pclfc = (lfc/lfc[1]-1.0)*100

f lfcpt = (lfc/pt)/10

f wkh1 = (yhr1/52)*1000.
title 1 Agriculture: Weekly Hours / Job

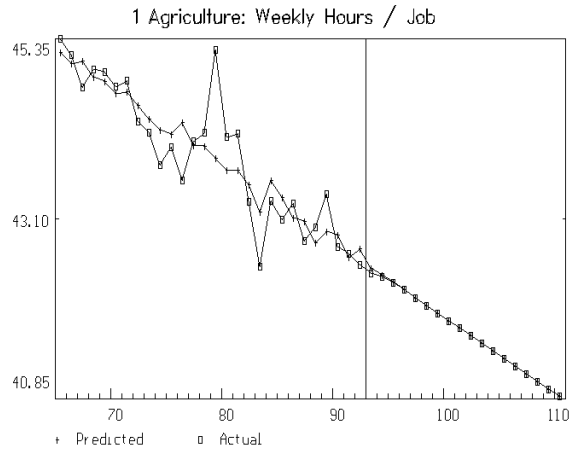

r wkh1 = time,dout

:                     1 Agriculture: Weekly Hours / Job
  SEE   =       0.39 RSQ   = 0.7936 RHO =   0.32 Obser  =   28 from 1965.000
  SEE+1 =       0.37 RBSQ  = 0.7770 DW  =   1.35 DoFree =   25 to   1992.000
  MAPE  =       0.66
    Variable name           Reg-Coef  Mexval t-value  Elas   NorRes     Mean
  0 wkh1                - - - - - - - - - - - - - - - - - - - - -     43.88
  1 intercept             45.87765  3928.3 201.355   1.05    4.84      1.00
  2 time                  -0.09514   118.9  -9.736  -0.05    1.06     21.50
  3 dout                   0.02415     3.1   1.256   0.00    1.00      2.17
gr *
f oldeq = depvar

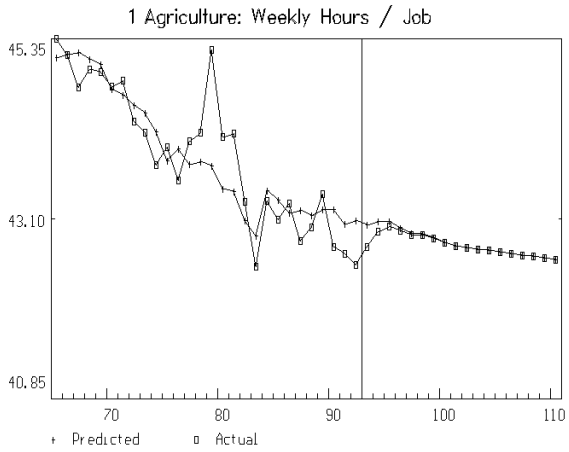

r wkh1 = lfcpt,un,dout

:                     1 Agriculture: Weekly Hours / Job
  SEE   =       0.43 RSQ   = 0.7536 RHO =   0.49 Obser  =   28 from 1965.000
  SEE+1 =       0.38 RBSQ  = 0.7228 DW  =   1.01 DoFree =   24 to   1992.000
  MAPE  =       0.76
    Variable name           Reg-Coef  Mexval t-value  Elas   NorRes     Mean
  0 wkh1                - - - - - - - - - - - - - - - - - - - - -     43.88
  1 intercept             51.58150   906.8  49.078   1.18    4.06      1.00
  2 lfcpt                 -0.15537    52.0  -5.606  -0.16    1.17     45.02
  3 un                    -0.12628     6.1  -1.732  -0.02    1.03      5.87
  4 dout                   0.01800     1.4   0.836   0.00    1.00      2.17
gr *
```

Linear Trend Equation



Labor Force Equation



```
vr 35.39
add hrsg.reg  50 "Trucking"
mode f
f yhr50 = hrs50/emp50
f dout  = (out50/out50[1]-1.0)*100
f pclfc = (lfc/lfc[1]-1.0)*100

f lfcpt = (lfc/pt)/10

f wkh50 = (yhr50/52)*1000.

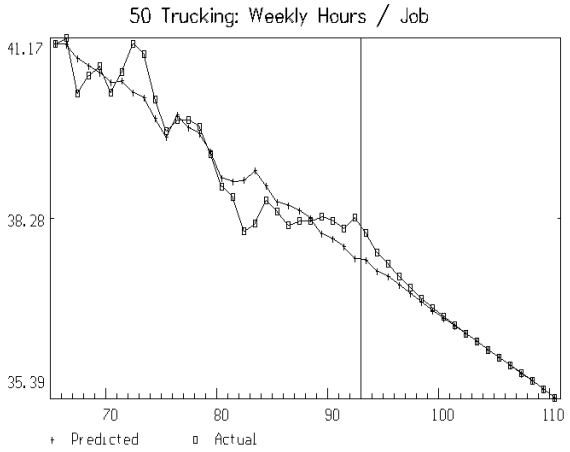
title 50 Trucking: Weekly Hours / Job
r wkh50 = time,dout

:                      50 Trucking: Weekly Hours / Job
  SEE   =       0.38 RSQ   = 0.8809 RHO =   0.67 Obser  =   28 from 1965.000
  SEE+1 =       0.29 RBSQ  = 0.8713 DW  =   0.66 DoFree =   25 to   1992.000
  MAPE  =       0.73
    Variable name           Reg-Coef  Mexval t-value  Elas   NorRes     Mean
  0 wkh50                 - - - - - - - - - - - - - - - - - - - - - -     39.41
  1 intercept               42.06160  3693.8 189.624   1.07    8.39      1.00
  2 time                   -0.12705   187.6 -13.483  -0.07    1.11     21.50
  3 dout                    0.02985     5.2   1.630   0.00    1.00      2.56
gr *
f oldeq = depvar

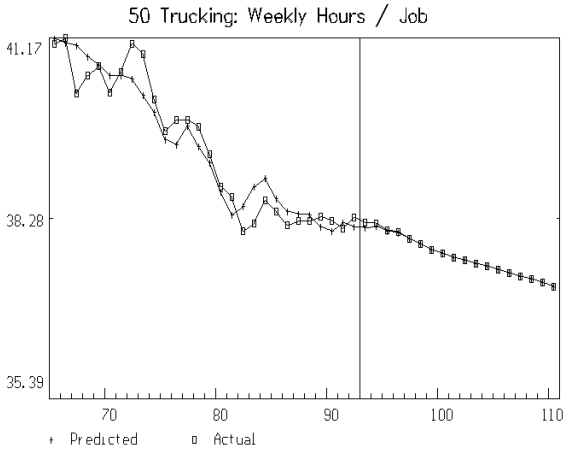

r wkh50 = lfcpt,dout,dout[1]

:                      50 Trucking: Weekly Hours / Job
  SEE   =       0.32 RSQ   = 0.9179 RHO =   0.50 Obser  =   28 from 1965.000
  SEE+1 =       0.27 RBSQ  = 0.9077 DW  =   1.00 DoFree =   24 to   1992.000
  MAPE  =       0.63
    Variable name           Reg-Coef  Mexval t-value  Elas   NorRes     Mean
  0 wkh50                 - - - - - - - - - - - - - - - - - - - - - -     39.41
  1 intercept               51.04150  1320.8  69.433   1.30   12.18      1.00
  2 lfcpt                  -0.26162   244.2 -16.132  -0.30    1.32     45.02
  3 dout                    0.01951     3.1   1.224   0.00    1.19      2.56
  4 dout[1]                 0.03448     9.3   2.158   0.00    1.00      2.70
gr *
```

Linear Trend Equation



Labor Force Equation



```
f yhr84 = hrs84/emp84
f dout  = (out84/out84[1]-1.0)*100
f pclfc = (lfc/lfc[1]-1.0)*100

f lfcpt = (lfc/pt)/10

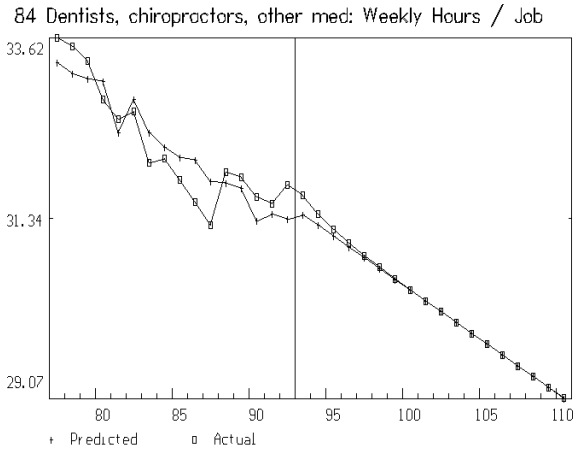
f wkh84 = (yhr84/52)*1000.
title 84 Dentists, chiropractors, other med: Weekly Hours / Job
r wkh84 = time,dout

:         84 Dentists, chiropractors, other med: Weekly Hours / Job
  SEE   =       0.31 RSQ   = 0.8196 RHO =   0.58 Obser  =   16 from 1977.000
  SEE+1 =       0.27 RBSQ  = 0.7918 DW  =   0.85 DoFree =   13 to   1992.000
  MAPE  =       0.86
    Variable name           Reg-Coef  Mexval t-value  Elas   NorRes     Mean
  0 wkh84                 - - - - - - - - - - - - - - - - - - - - - -     32.25
  1 intercept               36.28843  1791.0  68.087   1.13    5.54      1.00
  2 time                    -0.13622   125.0  -7.268  -0.12    1.18     27.50
  3 dout                    -0.05532     8.8  -1.542  -0.01    1.00      5.31
gr *
f oldeq = depvar

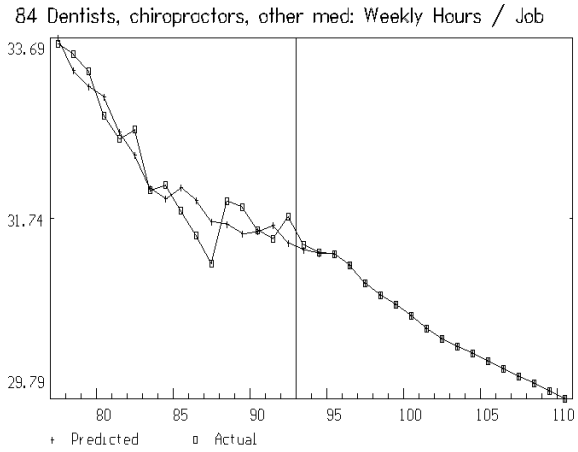

r wkh84 = lfcpt,un,un[1]

:         84 Dentists, chiropractors, other med: Weekly Hours / Job
  SEE   =       0.23 RSQ   = 0.8984 RHO =   0.19 Obser  =   16 from 1977.000
  SEE+1 =       0.23 RBSQ  = 0.8730 DW  =   1.62 DoFree =   12 to   1992.000
  MAPE  =       0.62
    Variable name           Reg-Coef  Mexval t-value  Elas   NorRes     Mean
  0 wkh84                 - - - - - - - - - - - - - - - - - - - - - -     32.25
  1 intercept               56.76021   579.0  23.263   1.76    9.84      1.00
  2 lfcpt                   -0.48514   212.9 -10.271  -0.72    1.62     48.14
  3 un                      -0.03569     1.0  -0.483  -0.01    1.28      6.55
  4 un[1]                   -0.14068    13.3  -1.845  -0.03    1.00      6.56
gr *
```

Linear Trend Equation



Labor Force Equation



```
vr 39.33
add hrsg.reg   9 "Food and tobacco"
mode f
f yhr9 = hrs9/emp9
f dout  = (out9/out9[1]-1.0)*100
f pclfc = (lfc/lfc[1]-1.0)*100

f lfcpt = (lfc/pt)/10

f wkh9 = (yhr9/52)*1000.

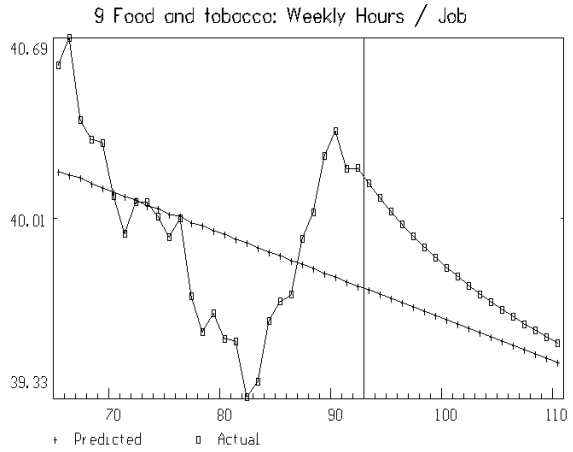
title 9 Food and tobacco: Weekly Hours / Job
r wkh9 = time,dout

:                   9 Food and tobacco: Weekly Hours / Job
  SEE   =       0.32 RSQ   = 0.1420 RHO =   0.90 Obser  =   28 from 1965.000
  SEE+1 =       0.16 RBSQ  = 0.0734 DW  =   0.19 DoFree =   25 to   1992.000
  MAPE  =       0.66
    Variable name           Reg-Coef  Mexval t-value  Elas   NorRes     Mean
  0 wkh9                  - - - - - - - - - - - - - - - - - - - - - -     39.97
  1 intercept               40.31027  4062.4 208.058   1.01    1.17      1.00
  2 time                    -0.01599     7.8  -2.020  -0.01    1.00     21.50
  3 dout                     0.00112     0.0   0.038   0.00    1.00      1.78
gr *
f oldeq = depvar

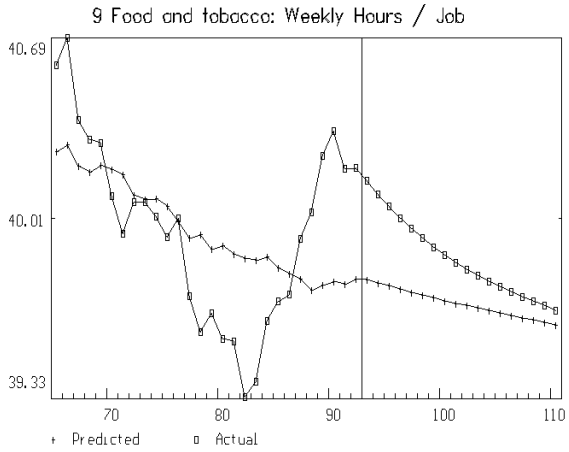

r wkh9 = lfcpt,dout,dout[1]

:                   9 Food and tobacco: Weekly Hours / Job
  SEE   =       0.30 RSQ   = 0.2551 RHO =   0.90 Obser  =   28 from 1965.000
  SEE+1 =       0.15 RBSQ  = 0.1620 DW  =   0.21 DoFree =   24 to   1992.000
  MAPE  =       0.62
    Variable name           Reg-Coef  Mexval t-value  Elas   NorRes     Mean
  0 wkh9                  - - - - - - - - - - - - - - - - - - - - - -     39.97
  1 intercept               42.00685  1054.9  56.368   1.05    1.34      1.00
  2 lfcpt                   -0.04454    15.5  -2.835  -0.05    1.00     45.02
  3 dout                    -0.00719     0.1  -0.209  -0.00    1.00      1.78
  4 dout[1]                 -0.01080     0.2  -0.317  -0.00    1.00      1.88
gr *
```

Linear Trend Equation



Labor Force Equation



```
vr 32.11
add hrsg.reg  63 "Real estate"
mode f
f yhr63 = hrs63/emp63
f dout  = (out63/out63[1]-1.0)*100
f pclfc = (lfc/lfc[1]-1.0)*100

f lfcpt = (lfc/pt)/10

f wkh63 = (yhr63/52)*1000.

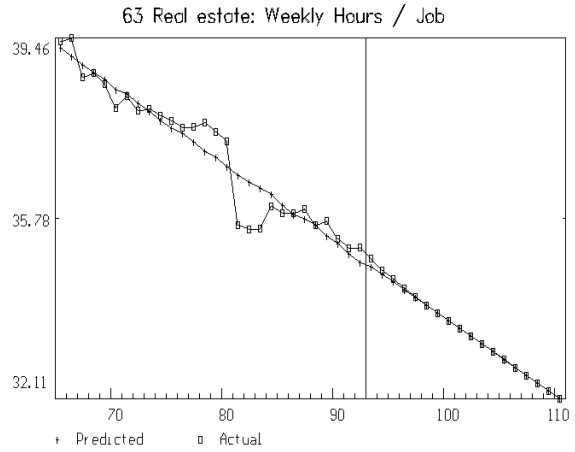
title 63 Real estate: Weekly Hours / Job
r wkh63 = time,dout

:                     63 Real estate: Weekly Hours / Job
  SEE   =       0.40 RSQ   = 0.9128 RHO =   0.55 Obser  =   28 from 1965.000
  SEE+1 =       0.33 RBSQ  = 0.9059 DW  =   0.89 DoFree =   25 to   1992.000
  MAPE  =       0.79
    Variable name           Reg-Coef  Mexval t-value  Elas   NorRes     Mean
  0 wkh63                 - - - - - - - - - - - - - - - - - - - - - -     37.07
  1 intercept               40.44642  3114.2 160.634   1.09   11.47      1.00
  2 time                    -0.15781   223.1 -15.360  -0.09    1.01     21.50
  3 dout                     0.00812     0.3   0.402   0.00    1.00      2.34
gr *
f oldeq = depvar

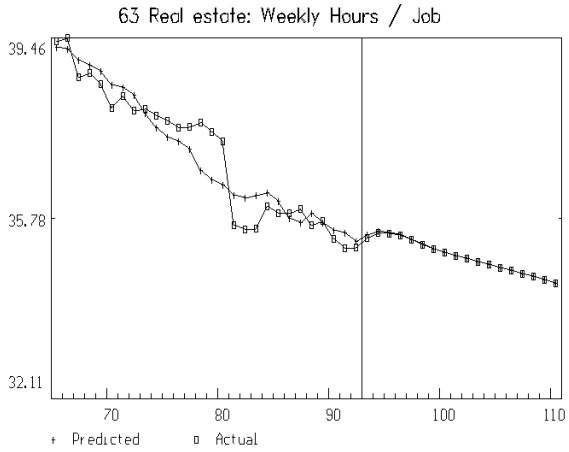

r wkh63 = lfcpt,dout,dout[1]

:                     63 Real estate: Weekly Hours / Job
  SEE   =       0.44 RSQ   = 0.8922 RHO =   0.62 Obser  =   28 from 1965.000
  SEE+1 =       0.35 RBSQ  = 0.8788 DW  =   0.76 DoFree =   24 to   1992.000
  MAPE  =       0.97
    Variable name           Reg-Coef  Mexval t-value  Elas   NorRes     Mean
  0 wkh63                 - - - - - - - - - - - - - - - - - - - - - -     37.07
  1 intercept               50.87894   853.3  46.442   1.37    9.28      1.00
  2 lfcpt                   -0.30893   184.2 -13.033  -0.38    1.07     45.02
  3 dout                     0.01921     1.4   0.836   0.00    1.03      2.34
  4 dout[1]                  0.02079     1.5   0.856   0.00    1.00      2.72
gr *
```

Linear Trend Equation



Labor Force Equation



```
vr 38.10 38.87
lim 70 92 110
add hrsf.reg  14 "Printing"
mode f
f yhr14 = hrs14/emp14
f dout  = (out14/out14[1]-1.0)*100
f pclfc = (lfc/lfc[1]-1.0)*100

f lfcpt = (lfc/pt)/10

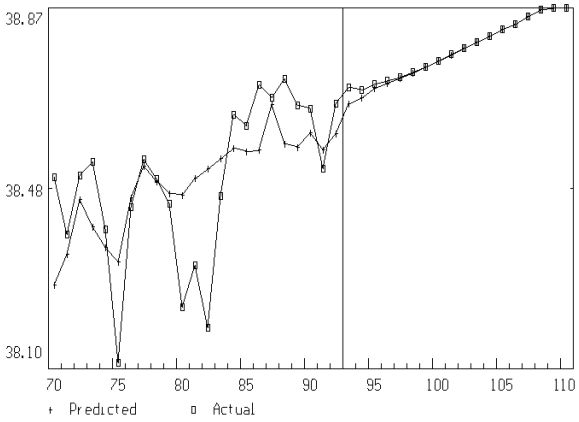
f wkh14 = (yhr14/52)*1000.
title 14 Printing: Weekly Hours / Job
r wkh14 = time,dout

:                      14 Printing: Weekly Hours / Job
  SEE   =       0.13 RSQ   = 0.3514 RHO =   0.52 Obser  =   23 from 1970.000
  SEE+1 =       0.12 RBSQ  = 0.2866 DW  =   0.95 DoFree =   20 to   1992.000
  MAPE  =       0.26
    Variable name           Reg-Coef  Mexval t-value  Elas   NorRes     Mean
  0 wkh14                 - - - - - - - - - - - - - - - - - - - - - -     38.50
  1 intercept               38.15264  7423.5 336.433   0.99    1.54      1.00
  2 time                     0.01338    20.4   2.996   0.01    1.13     24.00
  3 dout                     0.01085     6.1   1.582   0.00    1.00      2.30
gr *
f oldeq = depvar

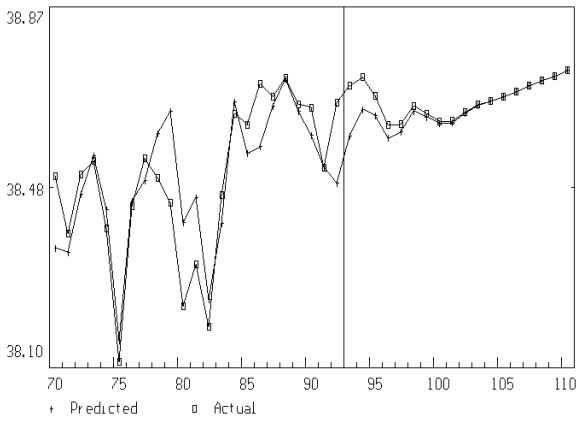

r wkh14 = lfcpt,un,un[1]

:                      14 Printing: Weekly Hours / Job
  SEE   =       0.09 RSQ   = 0.6863 RHO =   0.63 Obser  =   23 from 1970.000
  SEE+1 =       0.08 RBSQ  = 0.6367 DW  =   0.74 DoFree =   19 to   1992.000
  MAPE  =       0.18
    Variable name           Reg-Coef  Mexval t-value  Elas   NorRes     Mean
  0 wkh14                 - - - - - - - - - - - - - - - - - - - - - -     38.50
  1 intercept               37.72061  2576.9 116.601   0.98    3.19      1.00
  2 lfcpt                    0.02446    25.7   3.323   0.03    2.55     46.33
  3 un                      -0.12189    59.5  -5.417  -0.02    1.53      6.35
  4 un[1]                    0.06773    23.8   3.179   0.01    1.00      6.18
gr *
```

Linear Trend Equation



Labor Force Equation



```
vr off
lim 77 92 110
add hrsf.reg   83 "Physicians"
mode f
f yhr83 = hrs83/emp83
f dout  = (out83/out83[1]-1.0)*100
f pclfc = (lfc/lfc[1]-1.0)*100

f lfcpt = (lfc/pt)/10

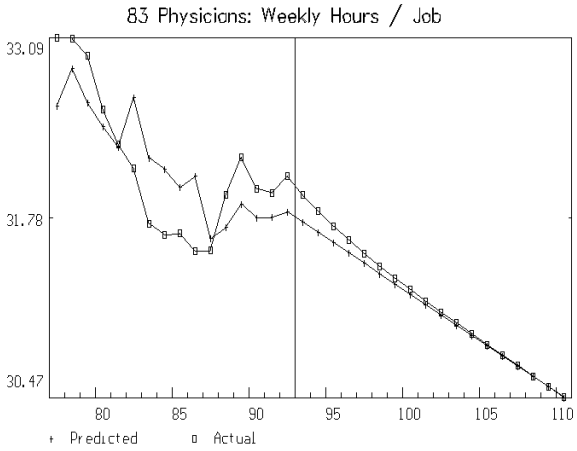
f wkh83 = (yhr83/52)*1000.
title 83 Physicians: Weekly Hours / Job
r wkh83 = time,dout

:                    83 Physicians: Weekly Hours / Job
  SEE   =       0.34 RSQ   = 0.5434 RHO =   0.77 Obser  =   16 from 1977.000
  SEE+1 =       0.25 RBSQ  = 0.4732 DW  =   0.46 DoFree =   13 to   1992.000
  MAPE  =       0.95
    Variable name           Reg-Coef  Mexval t-value  Elas   NorRes     Mean
  0 wkh83                 - - - - - - - - - - - - - - - - - - - - - -     32.16
  1 intercept               34.45211  1497.9  57.501   1.07    2.19      1.00
  2 time                    -0.07512    42.0  -3.633  -0.06    1.22     27.50
  3 dout                    -0.07126    10.7  -1.710  -0.01    1.00      3.22
gr *
f oldeq = depvar


r wkh83 = lfcpt,un,un[1]

:                    83 Physicians: Weekly Hours / Job
  SEE   =       0.22 RSQ   = 0.8040 RHO =   0.58 Obser  =   16 from 1977.000
  SEE+1 =       0.19 RBSQ  = 0.7550 DW  =   0.83 DoFree =   12 to   1992.000
  MAPE  =       0.55
    Variable name           Reg-Coef  Mexval t-value  Elas   NorRes     Mean
  0 wkh83                 - - - - - - - - - - - - - - - - - - - - - -     32.16
  1 intercept               48.56134   500.7  20.520   1.51    5.10      1.00
  2 lfcpt                   -0.30482   116.5  -6.654  -0.46    2.47     48.14
  3 un                      -0.05769     2.7  -0.805  -0.01    1.65      6.55
  4 un[1]                   -0.20619    28.4  -2.787  -0.04    1.00      6.56
gr *
```

Linear Trend Equation



Labor Force Equation

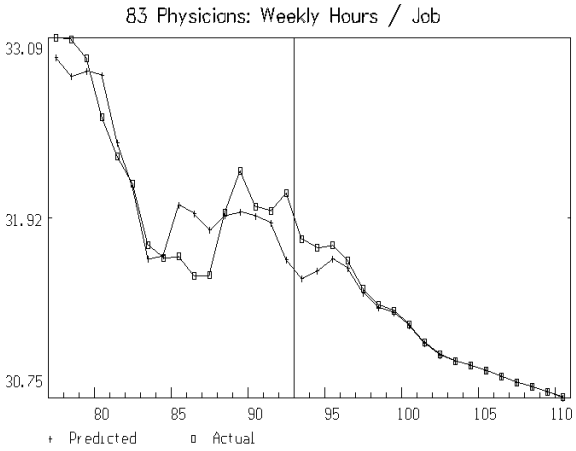


Table 4: Equation Estimation Results for Average Weekly Hours

3/16/94 Weekly Hours Estimations

Equation Type i	intercept	lfcpt	un	output	Rsquare	Rho
*60 Retail trade	57.216	-0.510	-0.044	0.022	0.973	0.811
*65 Hotels and repair services	62.403	-0.523	-0.412	0.058	0.950	0.771
* 1 Agriculture	51.582	-0.155	-0.126	0.018	0.754	0.493
3 Non ferrous metals	42.941	0.022	-0.457	0.010	0.484	0.754
7 Non metallic mining	45.425	0.010	-0.393	0.033	0.835	0.484
10 Textiles	41.438	0.046	-0.463	0.081	0.766	-0.098
11 Knitting	33.455	0.144	-0.246	0.052	0.677	0.133
12 Apparel	30.187	0.164	-0.194	0.037	0.657	0.596
13 Paper	38.307	0.095	-0.141	0.034	0.774	0.450
15 Ag fertilizers	38.238	0.083	-0.090	0.006	0.384	0.690
16 Chemicals, excl Drugs,	38.475	0.068	-0.135	0.012	0.685	0.678
17 Petroleum refining	35.562	0.155	-0.154	0.015	0.634	0.388
19 Rubber	38.459	0.088	-0.254	0.047	0.714	0.347
20 Plastic	36.316	0.097	-0.091	0.010	0.528	0.368
21 Shoes	38.245	0.020	-0.232	0.038	0.488	0.496
23 Furniture	40.014	0.015	-0.236	0.037	0.589	0.546
24 Stone clay glass	39.275	0.067	-0.208	0.038	0.797	0.599
25 Ferrous metals	32.242	0.240	-0.397	0.040	0.730	0.318
26 Copper	35.386	0.160	-0.238	0.023	0.723	0.362
27 Other nonferrous metal	36.654	0.135	-0.255	0.035	0.707	0.006
29 Engines and turbines	35.479	0.167	-0.360	0.033	0.703	0.504
30 Ag machinery	41.576	0.011	-0.241	0.026	0.581	0.528
31 Const mining oilfield	38.771	0.078	-0.188	0.024	0.528	0.493
32 Metalworking machinery	42.978	0.023	-0.383	0.026	0.809	0.279
33 Spec ind machinery	42.000	0.003	-0.206	0.023	0.803	0.372
34 Non electr machinery	40.271	0.048	-0.259	0.029	0.783	0.601
35 Computers	36.997	0.073	-0.023	0.008	0.325	0.116
36 Office equipment	37.127	0.075	-0.040	0.015	0.525	-0.007
37 Service industry machi	37.229	0.088	-0.166	0.025	0.736	0.259
39 Electrical appliances	38.144	0.087	-0.278	0.011	0.744	0.495
40 Household appliances	37.159	0.064	-0.082	0.037	0.613	0.353
41 Elec lighting and wiri	34.660	0.125	-0.073	0.046	0.852	-0.167
43 Motor vehicles	36.827	0.139	-0.280	0.050	0.703	-0.036
44 Aerospace	37.839	0.066	-0.055	0.014	0.762	0.432
45 Ships boats	39.011	0.034	-0.080	0.005	0.116	0.517
46 Other transportation e	36.036	0.092	-0.081	0.006	0.260	0.090
47 Instruments, excl medi	40.156	0.026	-0.139	0.010	0.653	0.159
48 Misc manufacturing	37.658	0.050	-0.093	0.010	0.427	0.628
51 Water transport	62.717	-0.461	-0.523	0.026	0.756	0.597
58 Water and sanitation	44.386	-0.047	-0.142	0.025	0.283	0.499
68 Movies and amusements	50.503	-0.423	-0.019	0.070	0.949	0.308
79 Drugs	38.507	0.037	-0.012	0.016	0.294	0.518

Equation Type e	intercept	lfcpt	output	Rsquare	Rho
*82 Private hospitals	33.230	0.019	0.008	0.031	0.053
5 Natural gas	44.165	-0.039	-0.039	0.072	0.647
42 TVs radios phonographs	31.682	0.170	0.011	0.555	0.369
52 Air transport	56.553	-0.392	0.079	0.753	0.147
53 Pipeline	39.813	0.039	-0.016	0.095	0.387
54 Transportation service	56.381	-0.376	0.058	0.789	0.502

Notes:

*	one of sixteen largest employment sectors
lfcpt	labor force participation (labor force as percent of population)
un	unemployment rate
output	percent change in industry output
[1]	one-year lag of variable

Table 4: Equation Estimation Results for Average Weekly Hours: Continued

3/16/94 Weekly Hours Estimations

Equation Type h	intercept	lfcpt	un	Rsquare	Rho
*61 Eating and drinking	65.860	-0.780	-0.232	0.963	0.805
*59 Wholesale trade	48.358	-0.188	-0.133	0.925	0.789
*62 Finance and insurance	40.292	-0.068	-0.046	0.774	0.719
2 Iron mining	42.598	0.035	-0.498	0.477	0.781
4 Coal mining	29.466	0.292	-0.337	0.470	0.544
56 Electric utilities	41.293	0.021	-0.116	0.283	0.239
57 Gas utilities	36.564	0.113	-0.107	0.393	0.830
67 Auto repairs	47.898	-0.198	-0.021	0.880	0.569
81 Ophthalmic goods	38.413	0.048	-0.108	0.375	0.097
85 Nursing homes	30.239	0.039	-0.083	0.119	0.779

Equation Type f	intercept	lfcpt	un	un[1]	Rsquare	Rho
* 8 Construction	39.115	0.024	-0.195	-0.070	0.568	0.676
*69 Education npo	56.527	-0.465	-0.177	-0.175	0.752	0.221
*84 Dentists, chiropractors, oth	56.760	-0.485	-0.036	-0.141	0.898	0.190
*14 Printing	37.721	0.024	-0.122	0.068	0.686	0.632
*83 Physicians and offices	48.561	-0.305	-0.058	-0.206	0.804	0.584
22 Lumber	41.103	-0.005	-0.358	0.214	0.435	0.494
28 Metal products	41.563	0.011	-0.356	0.143	0.492	0.220
38 Communic equipment	38.217	0.045	-0.129	0.103	0.704	0.297
49 Railroads	42.545	0.099	-0.414	-0.125	0.613	0.523
55 Communciation services	36.472	0.079	-0.164	0.065	0.453	0.146
80 Medical instruments	36.711	0.089	-0.221	0.083	0.501	0.497

Equation Type g	intercept	lfcpt	output	output[1]	Rsquare	Rho
*66 Business services	36.800	-0.029	0.040	-0.013	0.092	0.717
*50 Trucking	51.042	-0.262	0.020	0.034	0.918	0.499
* 9 Food and tobacco	42.007	-0.045	-0.007	-0.011	0.255	0.896
*63 Real estate	50.879	-0.309	0.019	0.021	0.892	0.622

Notes:

*	one of sixteen largest employment sectors
lfcpt	labor force participation (labor force as percent of population)
un	unemployment rate
output	percent change in industry output
[1]	one-year lag of variable

LIFT Forecasts with New Weekly Hours Equations

This section discusses several forecasts of the LIFT model using the newly estimated weekly hours equations. To test the properties of the new equations, three simulations were done with the model, and the results are compared to simulations done with the old weekly hours equations in the model. The base forecast is described first, and the results are compared to a base forecast with the original hours equations. The three simulations: increase labor force, labor productivity, and the oil price, then are discussed. In general, in a simulation that affects the unemployment rate, the model with the new equations will have less volatiliity in the unemployment rate than the original model.

Table 5 below is an update of Table 2, and shows the current scheme for calculating employment by industry in LIFT. Table 5 makes note of the fact that the equations are now estimated for average weekly hours, and that the equations now depend on different variables than before.

Table 5: Industry Employment in LIFT

Concept	Definition	LIFT name	How determined in LIFT
Labor productivity	output (77$) / total hours worked	PRD	equations time trends, increases in output, decreases in output
Total hours worked	output / productivity	HRS	identity
Weekly hours per job	(hours worked / number of jobs)/52		equations time inverse, changes in output, unemployment rate
Annual hours per job	weekly hours per job * 52	YHR	identity
Number of jobs	hours worked / annual hours per job	EMP	identity

Base Forecast with New Weekly Hours Equations

The equations illustrated in the first half of this paper were included in the LIFT model, and the forecast results compared to a base forecast with the old yearly hours equations. The only difference between the two forecasts is the inclusion of new equations for weekly hours. As shown in Figures 6-14, the forecasts of weekly hours by industry differ substantially due to the new equations. In the figures, the lines marked with squares show the new forecast, while the lines marked with plus signs show the original forecast. With most of the large service industries, the new equations forecast higher weekly hours than the old equations. (See Trucking, Wholesale trade, Real estate, and Business services.) Since weekly hours per job have been declining in services, the original equations, based on a linear time trend, showed continued declines in weekly hours. The new equations, based on the labor-force participation rate, more accurately capture the flattening out that has occured in weekly hours, and project that flattening

Figure 6: Weekly Hours - Base

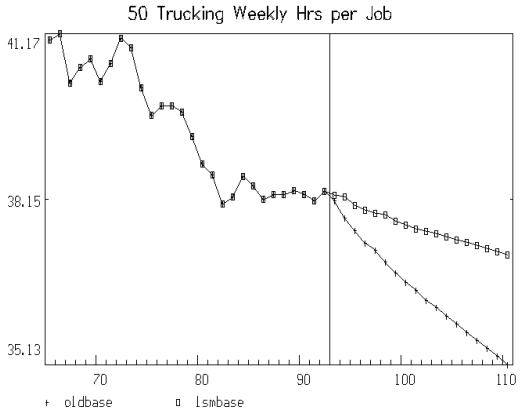


Figure 8: Weekly Hours - Base

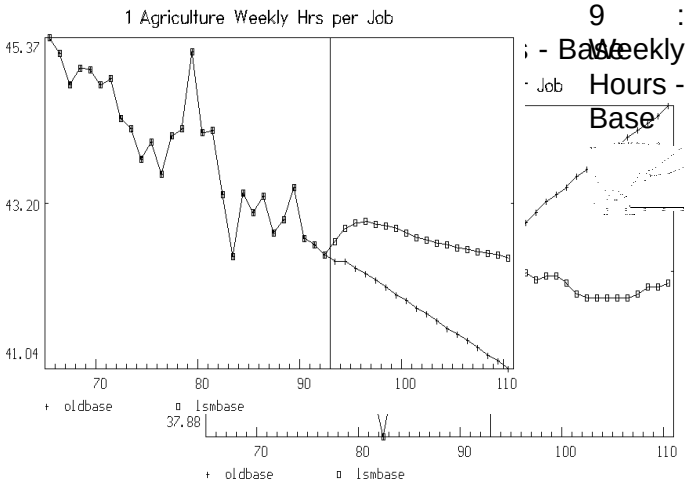


Figure 9 : Weekly Hours - Base

Figure 10: Weekly Hours -Base

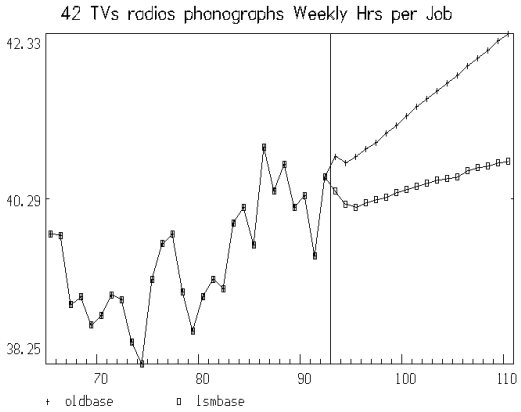


Figure 11: Weekly Hours -Base

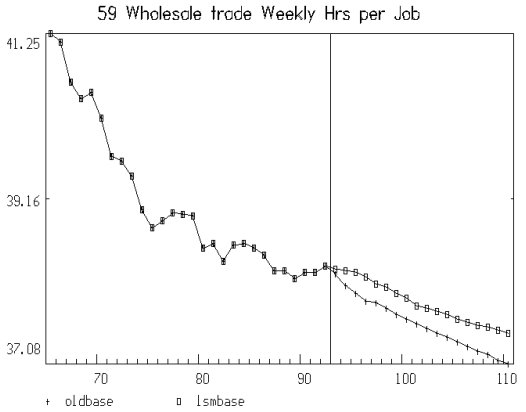


Figure 12: Weekly Hours -Base

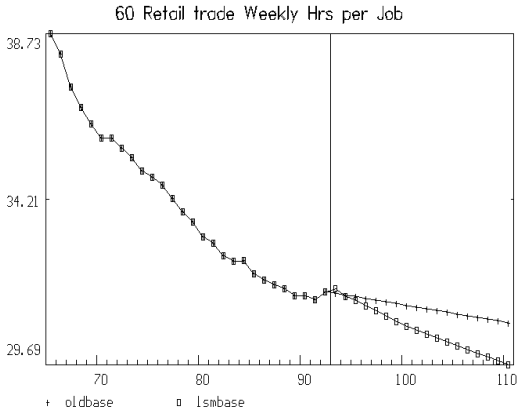


Figure 15: Weekly Hours -Base

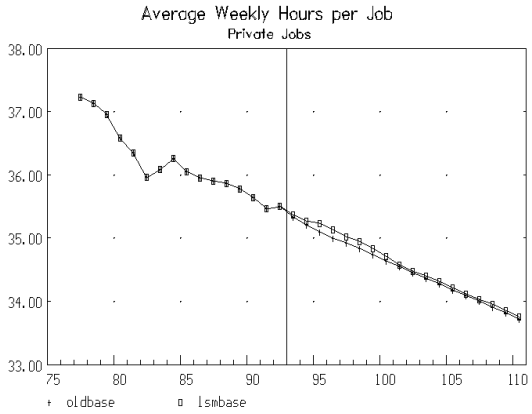
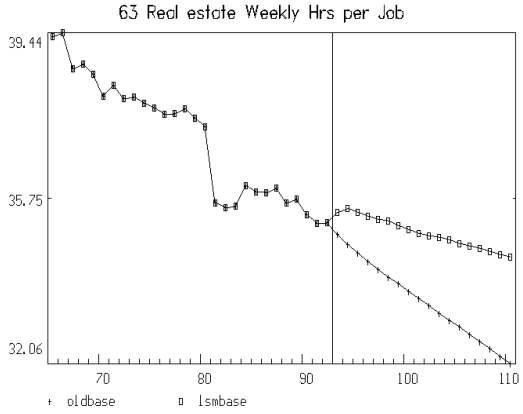


Figure 14: Weekly Hours - Base

Figure 13: Weekly Hours -Base



out to continue. One exception is Retail trade, Figure 12, where the new forecast of weekly hours is slightly lower than the original forecast. The new forecast is based on the labor-force equation, while the old forecast reflects a fix that overrode the original equation result.

Although weekly hours per job are higher for most of the large service industries, weekly hours are lower for many other sectors, mostly manufacturing. Weekly hours for Apparel, Construction, and TV's, do not continue to grow based on a linear time trend, but rather flatten out over the forecast horizon.

Although results by industry differ in the two model forecasts, the overall macroeconomic

results are surprisingly similar. The industry differences cancel out for the most part, and total private weekly hours per job are almost unchanged between the original and new base forecasts. (See Figure 15.) The overall changes in Gross National Product, unemployment, and inflation also are quite small. (See Table 6.)

Table 6: Macro Results of Base Forecast

Line 1: 3-1-94 LSM test lift85 OLDBASE
Line 2: 3/16/94 noon lsm wkh base #2 LSMBASE

Alternatives are shown in deviations from base values.

General Macroeconomic Summary

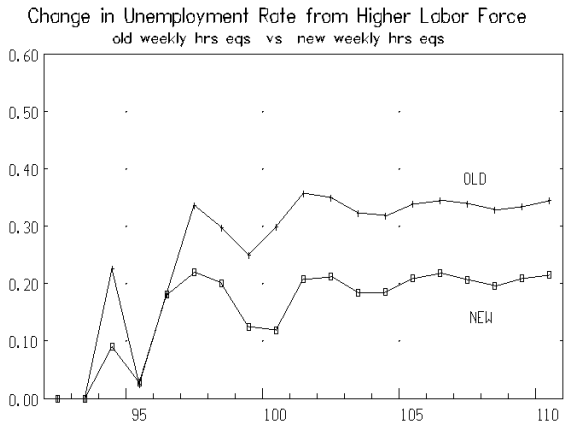
	1993	1994	1995	2000	2005	2010	93-95	94-05	05-10	94-10
Gross Domestic Product, bil $	6478	6794	7144	8905	10945	13580	4.9	4.3	4.3	4.3
	-3	1	10	-7	3	2	0.1	0.0	-0.0	-0.0
Gross Domestic Product, bil 77$	2874	2934	2984	3226	3463	3742	1.9	1.5	1.6	1.5
	1	5	7	-1	-6	-8	0.1	-0.0	-0.0	-0.0
GDP Components, billions 1977$										
Personal consumption	1950	1974	2002	2130	2270	2435	1.3	1.3	1.4	1.3
	0	4	5	-1	-4	-6	0.1	-0.0	-0.0	-0.0
Fixed investment	445	459	465	527	592	659	2.2	2.3	2.1	2.3
	0	2	3	-1	-3	-3	0.2	-0.1	-0.0	-0.1
Inventory change	18	17	16	15	15	16	-7.2	-1.2	1.2	-0.5
	0	0	0	-0	-0	-0	0.5	-0.3	-0.0	-0.2
Exports	450	471	491	568	633	719	4.5	2.7	2.5	2.6
	0	0	0	1	-0	-1	0.0	-0.0	-0.0	-0.0
Imports	471	475	485	536	594	658	1.4	2.0	2.1	2.0
	-0	1	1	-1	-1	-2	0.1	-0.0	-0.0	-0.0
Federal government	192	189	187	187	187	187	-1.2	-0.1	0.0	-0.0
	0	0	0	0	0	0	0.0	0.0	0.0	0.0
State & local gov.	312	319	326	353	377	400	2.2	1.5	1.2	1.4
	0	0	0	0	0	0	0.0	0.0	0.0	0.0
Price Level and Inflation Indicators										
GNP deflator (77=100)	224.0	230.1	237.9	274.4	314.3	361.2	3.0	2.8	2.8	2.8
	-0.2	-0.4	-0.2	-0.1	0.6	0.9	0.0	0.0	0.0	0.0
Mfg. Avg Hourly comp	243.6	253.7	262.2	305.8	355.8	414.5	3.7	3.1	3.1	3.1
	0.1	0.0	-0.2	-0.9	-0.6	-0.8	-0.1	-0.0	-0.0	-0.0
Private Labor Productivity	137.4	138.9	140.0	144.8	149.3	153.9	0.9	0.7	0.6	0.6
	0.2	0.1	-0.1	-0.4	-0.6	-0.7	-0.1	-0.0	-0.0	-0.0
Employment Indicators										
Total jobs, mil	125.4	127.3	128.9	136.8	144.5	153.4	1.4	1.2	1.2	1.2
	-0.2	-0.1	-0.1	0.1	0.1	0.1	0.1	0.0	-0.0	0.0
Labor force, mil	128.0	129.9	131.8	141.4	150.3	159.5	1.5	1.3	1.2	1.3
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Avg weekly hours, Private jobs	35.3	35.2	35.1	34.6	34.2	33.7	-0.3	-0.3	-0.3	-0.3
	0.0	0.1	0.1	0.1	0.0	0.0	0.1	-0.0	0.0	-0.0
Unemployment rate, %	7.1	6.7	6.3	6.4	6.8	6.6				
	0.2	0.1	0.0	-0.0	-0.1	-0.1				
Financial Indicators										
Three month T-bills, %	4.0	3.5	4.7	4.2	4.1	4.2				
	-0.2	-0.1	-0.1	0.0	0.1	-0.0				
10-year Treasury notes, %	6.7	6.0	6.6	6.0	6.0	6.1				
	-0.1	-0.1	-0.0	-0.0	0.0	-0.0				
M2 relative to GNP	0.58	0.59	0.58	0.59	0.60	0.60				
	0.00	0.00	-0.00	0.00	-0.00	0.00				
Other Variables										
Real disposable income	1503.7	1522.4	1540.1	1629.9	1731.3	1861.6	1.2	1.2	1.5	1.3
	-0.3	0.6	2.6	-0.5	-0.8	-2.2	0.1	-0.0	-0.0	-0.0
Savings rate, pct	4.0	3.8	3.6	3.3	3.2	3.4				
	0.0	-0.1	-0.1	0.0	0.1	0.0				
Nominal oil price	1.66	1.66	1.74	2.00	2.30	2.64	2.2	2.9	2.8	2.9
	0.00	0.00	0.00	0.00	0.01	0.01	0.0	0.0	0.0	0.0

Simulations with New Weekly Hours Equations: Increase Labor Force

Weekly hours in LIFT now are sensitive to the size of the labor force relative to overall population, as well as to the unemployment rate. A simulation that changes the size of the labor force will therefore test the properties of the weekly hours equations in two ways. An increase in the labor force directly affects the labor force participation variable used to determine weekly hours. In addition, an increase in the labor force implies an initial increase in the unemployment rate. That change in the unemployment rate also will affect weekly hours.

Two labor force simulations are compared here.[11] The first simulation was done with LIFT with the old weekly hours equations, and the second simulation uses the model with the new equations. In both cases, the labor force was increased by 1 percent over its Base assumption, beginning in 1994. In both cases, an increase in the labor force initially implies an increase in the unemployment rate. However, in the second case, weekly hours fall in a cyclical response to an increase in the unemployment rate. Fewer weekly hours per job, for a given level of hours required for production, implies more jobs. A higher level of jobs helps offset some of the initial increase in the unemployment rate. As shown in Figure 16, the increase in the unemployment rate with the new equations is less than half of the increase with the original model. (The graph shows two lines: the one marked with squares is the difference in the unemployment rate from the New Base and the New Model Labor Force Simulation. The one marked with pluses shows the difference between the Old Base and the Old Labor Force Simulation.)

Figure 16: Labor Force Simulations



In both cases, an increase in the labor force increases overall production in the economy, and real GNP is higher. (See Figure 18.) However, in the new model, which allows weekly hours to respond to changes in the labor force and to changes in the unemployment rate, the increase in GNP is smaller than in the original model. If only the growth rate of the labor force determined GNP growth, then a one percent increase in the labor force would imply a one percent increase in GNP. However, real GNP growth is determined by the growth in the labor force, in labor productivity, and by changes in the length of the average work week. (See Table 7.) Since the new weekly hours equations now provide an additional adjustment mechanism in the model, a change in the labor force has a smaller affect on real GNP than it did in the old version of the model.

[11] Detailed tables for the simulations appear in Appendix C.

Figure 17: Labor Force Simulations

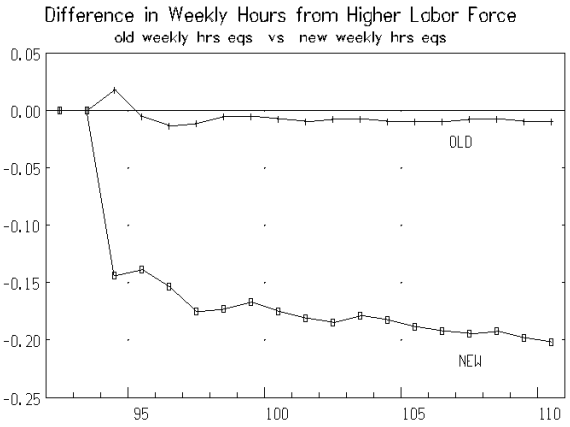


Figure 18: Labor Force Simulations

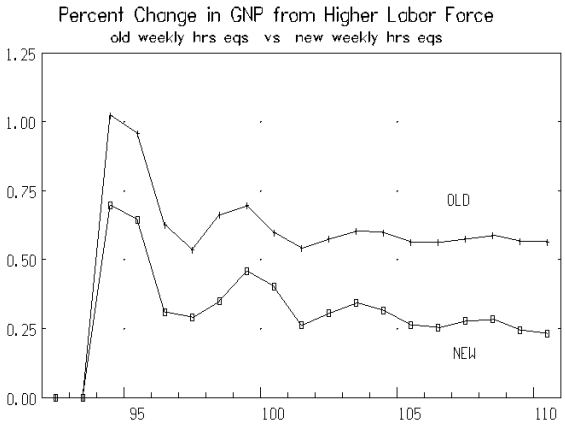


Table 7: Determinants of GNP Growth

LSM Base: New Weekly Hours Equations
Growth in GNP and Labor Force (annual percent change)

	1977-1985	1985-1992	1992-2000	2000-2005	2005-2010
Real GNP	2.3	2.3	1.8	1.4	1.5
Labor Force	1.9	1.4	1.3	1.2	1.2
+ Private Labor Productivity	0.6	1.2	0.8	0.6	0.6
+ Average Weekly Hours	-0.4	-0.2	-0.3	-0.3	-0.3

	1985	1992	2000	2005	2010
Unemployment Rate	7.2	7.4	6.3	6.7	6.5
Real GNP	2393.6	2812.4	3242.7	3474.7	3748.7

Increase Labor Force by One Percent
Growth in GNP and Labor Force (annual percent change)

	1977-1985	1985-1992	1992-2000	2000-2005	2005-2010
Real GNP	2.3	2.3	1.8	1.4	1.5
Labor Force	1.9	1.4	1.5	1.2	1.2
+ Private Labor Productivity	0.6	1.2	0.8	0.6	0.6
+ Average Weekly Hours	-0.4	-0.2	-0.3	-0.3	-0.3

Difference from base:	1985	1992	2000	2005	2010
Unemployment Rate	-	-	0.1	0.2	0.2
Real GNP, bill 77$	-	-	13.0	9.0	8.0
Real GNP, percent	-	-	0.4	0.3	0.2

Simulations with New Weekly Hours Equations: Increase Labor Productivity

This second experiment with the new equations can be considered a supply shock to the model. The scenario considers a permanent increase in labor productivity, or an outward shift in the aggregate supply curve. Although LIFT has the facility to conduct experiments on industry-level productivity, this simulation considers an economy-wide increase in productivity. The shock is therefore distributed among industries in proportion to their productivity growth rates.

As with the labor force simulations, the same assumption was made using the old version of LIFT, and then the new version of LIFT (new weekly hours equations). Because labor productivity is endogenous to the model, however, the net result of the identical fix for the two sets of simulations were different. The mechanism for applying the fix was an adjustment to the time trends used in determining labor productivity. In the second case, with the new model, the fix resulted in a higher increase in labor productivity than in the first case. (See Figure 19.)

The overall macro results of both cases are consistent with expected results of an aggregate supply shock. An increase in productivity increases real output and lowers the price level. The effect on the labor market differs however, between the two versions of the model. Initially, the unemployment rate rises because the change in demand from more productivity is not sufficient to absorb the labor released by the productivity increase. In the second case, where weekly hours respond to the unemployment rate, weekly hours fall as the unemployment rate rises, which increases the number of jobs required and lowers the unemployment rate. In the second simulation, therefore, the initial increase in the unemployment rate is smaller than in the first case, and the increase in real GNP is higher.

By the end of the simulation, the year 2010, labor productivity has increased more in the new model than in the old model. Partly because of the higher level of labor productivity, with more labor being released, the unemployment rate also is higher with the new equations. Because labor productivity is higher, but the average work week is lower, the change in real GNP is almost identical between the old and new versions of the model. In the old model, real GNP is 29.8% higher in the year 2010 than in 1994; while in the new version of the model, real GNP in 2010 is 29.5% higher than in 1994.

Figure 19: Productivity Simulation

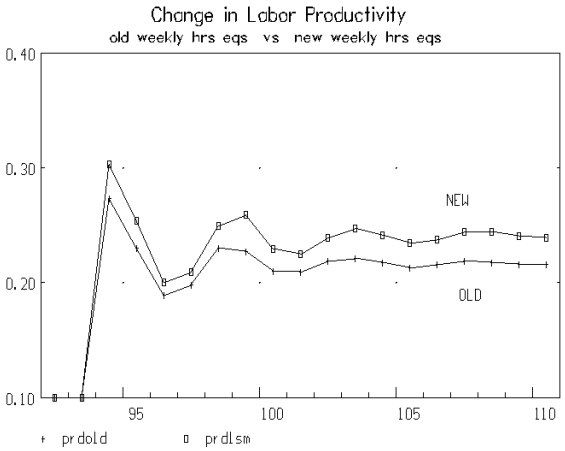


Figure 21: Productivity Simulations

Figure 22: Productivity Simulations

Simulations with New Weekly Hours Equations: Oil Price Shock

As with an increase in labor productivity, an energy price increase also can be considered a supply shock. In these scenarios, the price of crude petroleum was assumed to increase by 50% for two years, and then return to its base level in 1996. (See Figure 23.) In the case of an oil-price shock, the new weekly hours equations have only a small effect on the overall macro properties of the model. As shown in Figure 24, the unemployment rate change is quite similar in both versions of the model. By the year 2010, both models show that the long-run effect of the two-year price shock is practically zero. The new model more closely approaches zero change in 2010, as both the unemployment rate and real GNP are closer to their base levels. (Figures 24 and 25.) In both versions of the model, the shock introduces a cycle, that dampens over the forecast horizon. For instance, the unemployment rate is lower than the base in 1997, but higher than the base in 1999. While the new equations seem to dampen the cycle effect in the unemployment rate, they seem to enhance the cyclical effect on real GNP. (The changes in real GNP are larger in absolute value in the new version of the model than in the original version.)

Figure 23: Oil Price Simulations

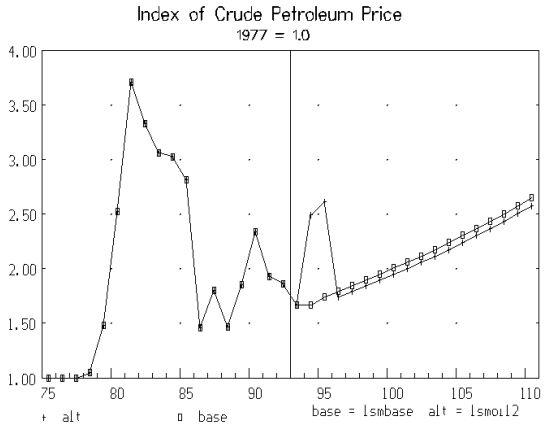


Figure 24: Oil Price Simulations

Figure 25: Oil Price Simulations

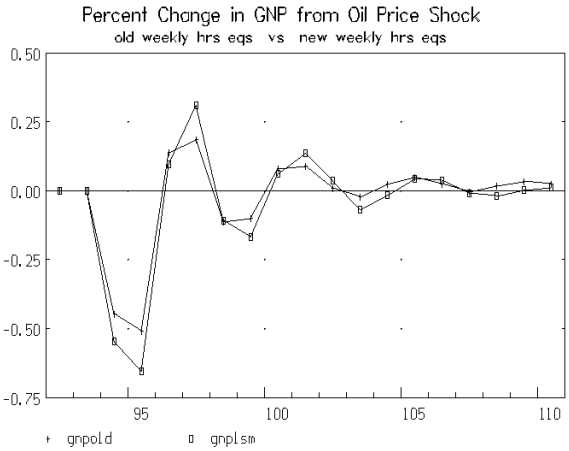
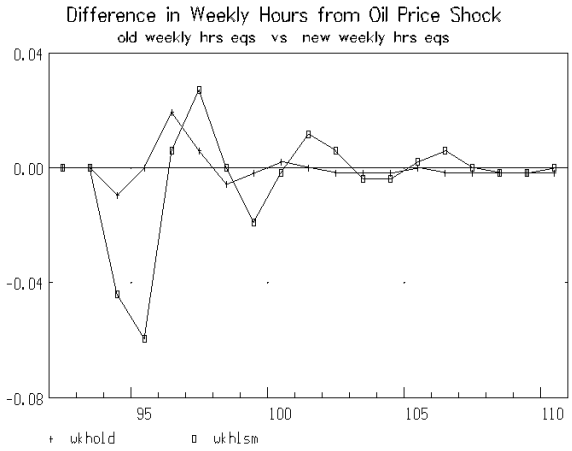


Figure 26: Oil Price Simulations



Conclusions

The average weekly hours equations in LIFT play a role in determining employment by industry in the model. They provide the link between the results from equations that determine labor productivity and the total number of jobs required given that level of productivity and a certain level of demand. In the work described here, the equations were re-estimated with two goals in mind. The first goal was to improve the trend variable used in forecasting the equations. A linear time trend was replaced by the labor-force participation rate, which had two advantages. First, the participation rate captures the changes in the trend of weekly hours that has occurred for most industries over the past few years more accurately than a linear time trend. Second, weekly hours now depend on a variable with more economic meaning than just a time trend. As shown in the first simulation described here, the weekly hours equations will now respond to changes in the labor force, in a way consistent with historical behavior.

The second, and perhaps more important, area of change in re-estimating the equations concerned the cyclical properties of weekly hours. Many of the equations now respond to changes in the overall unemployment rate, which reflects more accurately what happens in the labor market over the business cycle. As a recession looms, firms cut back on over-time hours and switch some workers to part-time status, which shortens the length of the work week. Conversely, as a recovery dawns, firms increase over-time hours and switch workers from part-time to full-time, which increases the length of the work week. LIFT's weekly hours equations now reflect that behavior.

As illustrated with three test simulations, the new weekly hours equations modestly change the macro properties of LIFT. In the case of an increase in the labor force, LIFT now employs more of those workers than before, and the unemployment rate does not rise by as much as it did in the old scenario. Increasing labor productivity in LIFT leads to higher real GNP and a higher unemployment rate. The new equations did little to change these properties, although the change in the unemployment rate was higher in the new simulation than in the old. This is at least partly due to the fact that the new model also had higher labor productivity.[12] In the final simulation, an increase in oil prices, the cyclical properties of the model were changed somewhat, although the substantive results from the shock were mostly unchanged. The unemployment rate was slightly less volatile than in the original model simulation, while the changes in GNP were slightly larger. By the end of the forecast, the new model more closely showed the desired properties of no long-run affect from the temporary oil-price shock, with the change in the unemployment rate and in real GNP close to zero.

[12] A simulation was done with the model that applied a different initial fix to labor productivity, to get the same net change on productivity as in the simulation with the base forecast. In that scenario, the increase in the unemployment rate was still higher than the increase in the unemployment rate from the old model. The difference was smaller, however, than the difference in the scenario described above.

Appendix A: Nonlinear Time Trend

As a simple exercise for examining the effects of different values of average weekly hours on the rest of the model, the industry equations were all re-estimated using a nonlinear time trend in place of a linear time trend. When included in LIFT, the time-inverse equations imply higher average yearly hours than in the base forecast. (See Figures A1 and A2: dec22 is the base forecast and jan11 is the forecast with time-inverse equations.) By the year 2010, the average work week is 34.5 hours long, compared to 33.7 hours long in the base forecast. Higher hours per job implies that fewer jobs are created, and the unemployment rate is higher by half a percentage point by 2010. The overall macro effects of the different hours are relatively small: real GDP is 51 billion 1977$ higher by 2010 than in the base, and inflation is slightly lower.

Figure A1: LIFT Forecast with Time Inverse

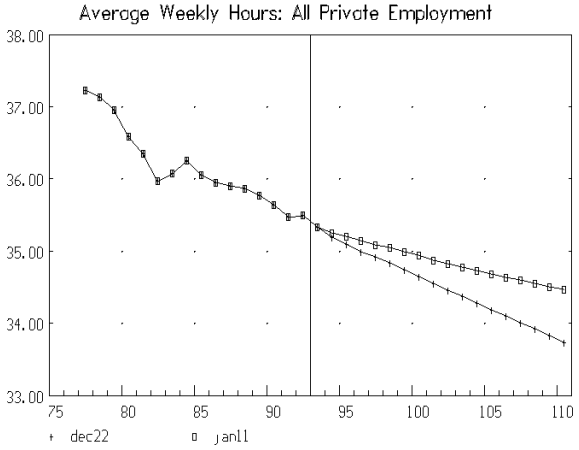
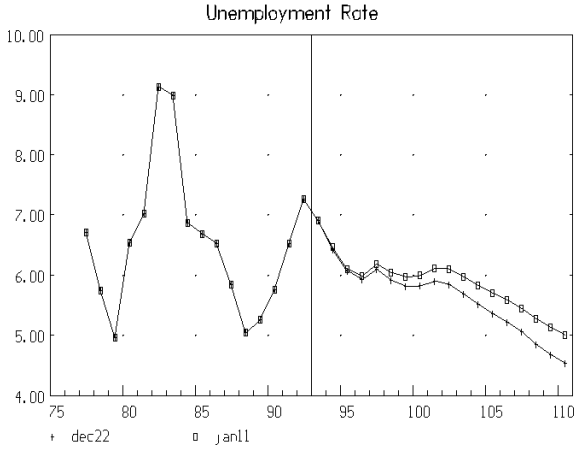


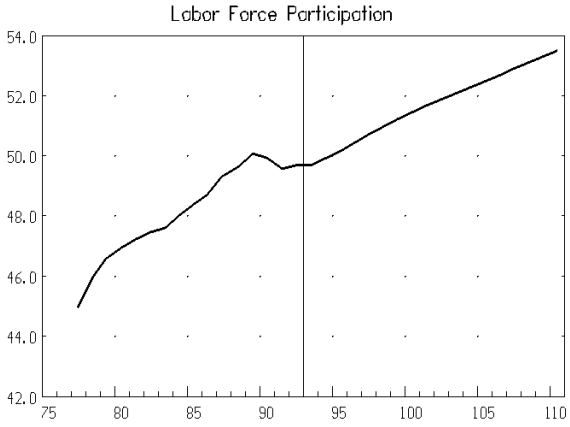
Figure A2: LIFT Forecast with Time Inverse



A second test simulation was done where some sectors use the nonlinear time trend, while others use the labor-force participation trend. The macro effects of the second simulation, labeled feb16, are smaller than the effects from the first simulation. In the LIFT model, that participation rate is assumed to grow fairly steadily, from 45 percent in 1977 to almost 54 percent in 2010. (See Figure A3.) The slope of the labor-force participation rate is closer to the slope of the linear

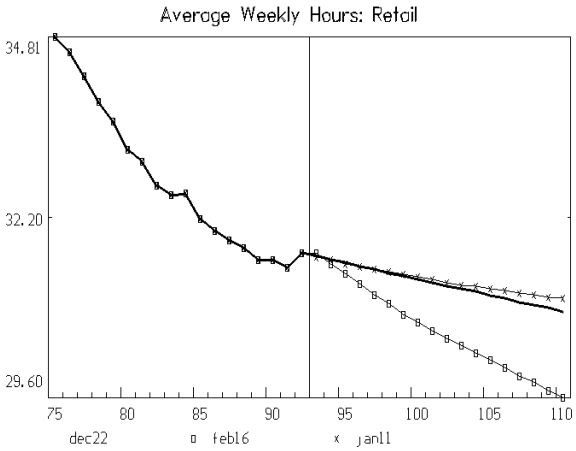
trend variable than to the nonlinear trend, so the forecast with these equations more closely resembles the base.

Figure A3: LIFT Assumption



Although results for all 85 industries from both simulations cannot be discussed here, results for one example will be illustrated. The forecast graphs show three forecasts with LIFT: the base forecast, labeled dec22 and shown by a solid thick line; the time-inverse forecast, labeled jan11 and shown by a line marked with X's, and the labor-force participation forecast, labeled feb16 and shown by a line marked with squares. In the case of Retail trade, Figure A4, the time-inverse forecast and the base forecast are practically identical. The difference, however, is that the base forecast was achieved with a fix on hours overriding the old equation, while the jan11 forecast represents the results of using an equation that depends on the inverse of time. The non-linear time trend is a way of mechanizing an "eyeball" judgement that shows the decline in hours leveling out. The equation based on labor-force participation shows average hours continuing to decline in Retail trade, more than as indicated by the time-inverse equation, due to the assumption of a continued rise in the labor-force participation rate.

Figure A4: LIFT Results



Appendix B: The Multiple Job Adjustment

Historically, the multiple job adjustment has shown cyclical behavior: the adjustment generally peaks before a recession and doesn't begin to recover until the recession has ended. In a bad job market, it is more likely that individuals who may have been holding down more than one job will lose at least one of those jobs. In the LIFT forecast, the multiple job adjustment is assumed to be constant. This implies that the unemployment rate may not be as responsive to changes in industry employment in LIFT forecasts as it has been historically.

Figure B1: LIFT Assumption

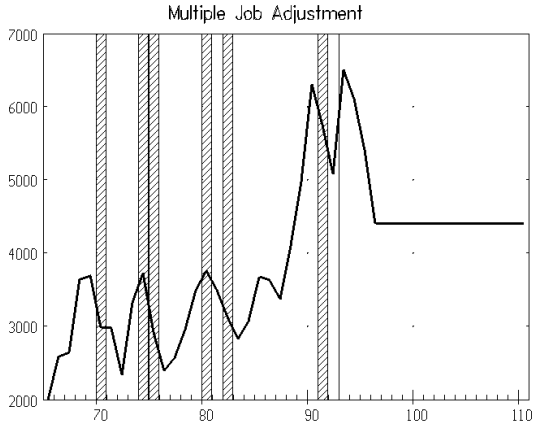
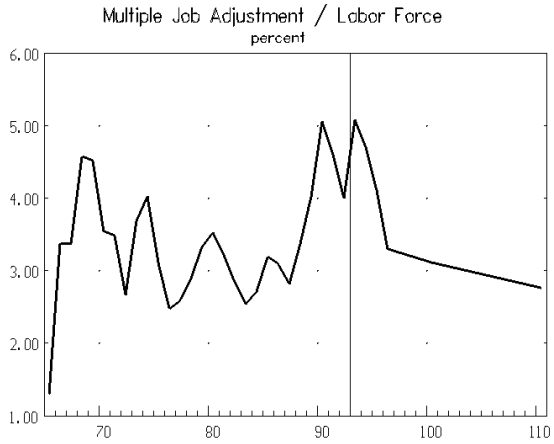


Figure B2: LIFT Assumption



Appendix C: Simulation Tables

OLD MODEL, LFC UP

Line 1: 3-1-94 LSM test lift85
Line 2: 3/15/94 1:3p old yhr LFC higher

Alternatives are shown in deviations from base values.

General Macroeconomic Summary

	1993	1994	1995	2000	2005	2010	93-95	94-05	05-10	94-10
Gross Domestic Product, bil $	6478	6794	7144	8905	10945	13580	4.9	4.3	4.3	4.3
	0	41	33	-37	-44	-60	0.2	-0.1	-0.0	-0.1
Gross Domestic Product, bil 77$	2874	2934	2984	3226	3463	3742	1.9	1.5	1.6	1.5
	0	30	28	19	19	20	0.5	-0.0	-0.0	-0.0
GDP Components, billions 1977$										
Personal consumption	1950	1974	2002	2130	2270	2435	1.3	1.3	1.4	1.3
	0	24	22	17	19	20	0.6	-0.0	-0.0	-0.0
Fixed investment	445	459	465	527	592	659	2.2	2.3	2.1	2.3
	-0	12	10	4	3	3	1.1	-0.2	-0.0	-0.1
Inventory change	18	17	16	15	15	16	-7.2	-1.2	1.2	-0.5
	0	2	1	0	0	0	3.3	-0.9	0.1	-0.6
Exports	450	471	491	568	633	719	4.5	2.7	2.5	2.6
	0	1	0	2	1	1	0.0	0.0	-0.0	0.0
Imports	471	475	485	536	594	658	1.4	2.0	2.1	2.0
	0	8	5	3	3	3	0.6	-0.1	-0.0	-0.1
Federal government	192	189	187	187	187	187	-1.2	-0.1	0.0	-0.0
	0	0	0	0	0	0	0.0	0.0	0.0	0.0
State & local gov.	312	319	326	353	377	400	2.2	1.5	1.2	1.4
	0	0	0	0	0	0	0.0	0.0	0.0	0.0
Price Level and Inflation Indicators										
GNP deflator (77=100)	224.0	230.1	237.9	274.4	314.3	361.2	3.0	2.8	2.8	2.8
	0.0	-1.0	-1.1	-2.7	-3.0	-3.6	-0.2	-0.0	-0.0	-0.0
Mfg. Avg Hourly comp	243.6	253.7	262.2	305.8	355.8	414.5	3.7	3.1	3.1	3.1
	0.0	-0.3	-1.1	-2.2	-2.5	-2.9	-0.2	-0.1	-0.0	-0.0
Private Labor Productivity	137.4	138.9	140.0	144.8	149.3	153.9	0.9	0.7	0.6	0.6
	0.0	0.3	-0.1	-0.2	-0.1	-0.1	-0.0	-0.0	0.0	-0.0
Employment Indicators										
Total jobs, mil	125.4	127.3	128.9	136.8	144.5	153.4	1.4	1.2	1.2	1.2
	-0.0	0.9	1.2	0.9	0.9	0.9	0.5	-0.0	-0.0	-0.0
Labor force, mil	128.0	129.9	131.8	141.4	150.3	159.5	1.5	1.3	1.2	1.3
	0.0	1.3	1.3	1.4	1.5	1.6	0.5	-0.0	0.0	0.0
Avg weekly hours, Private jobs	35.3	35.2	35.1	34.6	34.2	33.7	-0.3	-0.3	-0.3	-0.3
	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
Unemployment rate, %	7.1	6.7	6.3	6.4	6.8	6.6				
	0.0	0.2	0.0	0.3	0.3	0.3				
Financial Indicators										
Three month T-bills, %	4.0	3.5	4.7	4.2	4.1	4.2				
	0.0	-0.4	-0.2	-0.4	-0.3	-0.4				
10-year Treasury notes, %	6.7	6.0	6.6	6.0	6.0	6.1				
	0.0	-0.2	-0.2	-0.2	-0.1	-0.1				
M2 relative to GNP	0.58	0.59	0.58	0.59	0.60	0.60				
	0.00	-0.00	-0.00	0.00	0.00	0.00				

				Other Variables						
Real disposable income	1503.7	1522.4	1540.1	1629.9	1731.3	1861.6	1.2	1.2	1.5	1.3
	0.0	12.4	14.5	5.4	6.8	6.6	0.5	-0.0	-0.0	-0.0
Savings rate, pct	4.0	3.8	3.6	3.3	3.2	3.4				
	0.0	-0.4	-0.2	-0.4	-0.3	-0.4				
Nominal oil price	1.66	1.66	1.74	2.00	2.30	2.64	2.2	2.9	2.8	2.9
	0.00	0.00	0.00	-0.01	-0.01	-0.01	0.0	-0.0	-0.0	-0.0

OLD MODEL, PRODUCT UP
Line 1: 3-1-94 LSM test lift85
Line 2: 3/15/94 11:3a old yhr PRD higher

Alternatives are shown in deviations from base values.

General Macroeconomic Summary

	1993	1994	1995	2000	2005	2010	93-95	94-05	05-10	94-10
Gross Domestic Product, bil $	6478	6794	7144	8905	10945	13580	4.9	4.3	4.3	4.3
	0	25	46	-1	-8	-15	0.3	-0.0	-0.0	-0.0
Gross Domestic Product, bil 77$	2874	2934	2984	3226	3463	3742	1.9	1.5	1.6	1.5
	0	42	46	31	28	29	0.8	-0.1	-0.0	-0.0
				GDP Components, billions 1977$						
Personal consumption	1950	1974	2002	2130	2270	2435	1.3	1.3	1.4	1.3
	0	32	33	24	24	24	0.8	-0.1	-0.0	-0.0
Fixed investment	445	459	465	527	592	659	2.2	2.3	2.1	2.3
	-0	18	21	9	7	7	2.2	-0.3	-0.0	-0.2
Inventory change	18	17	16	15	15	16	-7.2	-1.2	1.2	-0.5
	0	3	2	0	-0	0	5.7	-1.4	0.1	-1.0
Exports	450	471	491	568	633	719	4.5	2.7	2.5	2.6
	0	1	1	3	3	3	0.1	0.0	-0.0	0.0
Imports	471	475	485	536	594	658	1.4	2.0	2.1	2.0
	0	11	10	5	5	5	1.0	-0.1	-0.0	-0.1
Federal government	192	189	187	187	187	187	-1.2	-0.1	0.0	-0.0
	0	0	0	0	0	0	0.0	0.0	0.0	0.0
State & local gov.	312	319	326	353	377	400	2.2	1.5	1.2	1.4
	0	0	0	0	0	0	0.0	0.0	0.0	0.0
				Price Level and Inflation Indicators						
GNP deflator (77=100)	224.0	230.1	237.9	274.4	314.3	361.2	3.0	2.8	2.8	2.8
	0.0	-2.5	-2.1	-2.6	-2.8	-3.2	-0.4	0.0	0.0	0.0
Mfg. Avg Hourly comp	243.6	253.7	262.2	305.8	355.8	414.5	3.7	3.1	3.1	3.1
	0.0	1.0	1.5	1.8	2.1	2.4	0.3	0.0	-0.0	0.0
Private Labor Productivity	137.4	138.9	140.0	144.8	149.3	153.9	0.9	0.7	0.6	0.6
	0.0	2.7	2.3	2.1	2.1	2.2	0.8	-0.0	-0.0	-0.0
				Employment Indicators						
Total jobs, mil	125.4	127.3	128.9	136.8	144.5	153.4	1.4	1.2	1.2	1.2
	-0.0	-0.3	0.2	-0.3	-0.4	-0.5	0.1	-0.0	-0.0	-0.0
Labor force, mil	128.0	129.9	131.8	141.4	150.3	159.5	1.5	1.3	1.2	1.3
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Avg weekly hours, Private jobs	35.3	35.2	35.1	34.6	34.2	33.7	-0.3	-0.3	-0.3	-0.3
	0.0	-0.0	-0.0	-0.1	-0.1	-0.1	-0.1	-0.0	-0.0	-0.0
Unemployment rate, %	7.1	6.7	6.3	6.4	6.8	6.6				
	0.0	0.3	-0.2	0.2	0.3	0.3				
				Financial Indicators						
Three month T-bills, %	4.0	3.5	4.7	4.2	4.1	4.2				
	0.0	-0.9	-0.1	-0.2	-0.3	-0.3				
10-year Treasury notes, %	6.7	6.0	6.6	6.0	6.0	6.1				
	0.0	-0.5	-0.3	-0.1	-0.1	-0.1				
M2 relative to GNP	0.58	0.59	0.58	0.59	0.60	0.60				
	0.00	-0.00	-0.00	0.00	0.00	0.00				
				Other Variables						
Real disposable income	1503.7	1522.4	1540.1	1629.9	1731.3	1861.6	1.2	1.2	1.5	1.3
	0.0	14.7	25.2	13.1	12.0	11.3	0.8	-0.0	-0.0	-0.0
Savings rate, pct	4.0	3.8	3.6	3.3	3.2	3.4				
	0.0	-0.6	-0.0	-0.2	-0.3	-0.3				
Nominal oil price	1.66	1.66	1.74	2.00	2.30	2.64	2.2	2.9	2.8	2.9
	0.00	0.00	0.00	-0.00	0.00	0.00	0.0	0.0	0.0	0.0

OLD MODEL, OIL SHOCK
Line 1: 3-1-94 LSM test lift85
Line 2: 3/15/94 5:0p old yhr Oil Shock (#2)

Alternatives are shown in deviations from base values.

General Macroeconomic Summary

	1993	1994	1995	2000	2005	2010	93-95	94-05	05-10	94-10
Gross Domestic Product, bil $	6478	6794	7144	8905	10945	13580	4.9	4.3	4.3	4.3
	0	-17	-43	11	12	13	-0.3	0.0	-0.0	0.0
Gross Domestic Product, bil 77$	2874	2934	2984	3226	3463	3742	1.9	1.5	1.6	1.5
	0	-13	-15	3	2	1	-0.3	0.0	-0.0	0.0
GDP Components, billions 1977$										
Personal consumption	1950	1974	2002	2130	2270	2435	1.3	1.3	1.4	1.3
	0	-11	-13	3	2	1	-0.3	0.1	-0.0	0.0
Fixed investment	445	459	465	527	592	659	2.2	2.3	2.1	2.3
	-0	-5	-5	1	1	0	-0.6	0.1	-0.0	0.1
Inventory change	18	17	16	15	15	16	-7.2	-1.2	1.2	-0.5
	0	-1	-0	0	0	0	-1.6	0.4	-0.1	0.3
Exports	450	471	491	568	633	719	4.5	2.7	2.5	2.6
	0	-0	-0	-0	-0	-0	-0.0	0.0	-0.0	0.0
Imports	471	475	485	536	594	658	1.4	2.0	2.1	2.0
	0	-4	-4	1	0	0	-0.4	0.1	-0.0	0.1
Federal government	192	189	187	187	187	187	-1.2	-0.1	0.0	-0.0
	0	0	0	0	0	0	0.0	0.0	0.0	0.0
State & local gov.	312	319	326	353	377	400	2.2	1.5	1.2	1.4
	0	0	0	0	0	0	0.0	0.0	0.0	0.0
Price Level and Inflation Indicators										
GNP deflator (77=100)	224.0	230.1	237.9	274.4	314.3	361.2	3.0	2.8	2.8	2.8
	0.0	0.4	-0.2	0.2	0.2	0.3	-0.0	-0.0	0.0	-0.0
Mfg. Avg Hourly comp	243.6	253.7	262.2	305.8	355.8	414.5	3.7	3.1	3.1	3.1
	0.0	0.1	0.1	-0.3	-0.1	-0.1	0.0	-0.0	0.0	-0.0
Private Labor Productivity	137.4	138.9	140.0	144.8	149.3	153.9	0.9	0.7	0.6	0.6
	0.0	-0.1	-0.1	0.1	-0.0	-0.0	-0.0	0.0	-0.0	0.0
Employment Indicators										
Total jobs, mil	125.4	127.3	128.9	136.8	144.5	153.4	1.4	1.2	1.2	1.2
	-0.0	-0.4	-0.5	0.0	0.1	0.1	-0.2	0.0	-0.0	0.0
Labor force, mil	128.0	129.9	131.8	141.4	150.3	159.5	1.5	1.3	1.2	1.3
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Avg weekly hours, Private jobs	35.3	35.2	35.1	34.6	34.2	33.7	-0.3	-0.3	-0.3	-0.3
	0.0	-0.0	0.0	0.0	0.0	-0.0	0.0	0.0	-0.0	0.0
Unemployment rate, %	7.1	6.7	6.3	6.4	6.8	6.6				
	0.0	0.3	0.4	-0.0	-0.0	-0.0				
Financial Indicators										
Three month T-bills, %	4.0	3.5	4.7	4.2	4.1	4.2				
	0.0	-0.0	-0.4	-0.0	0.0	0.0				
10-year Treasury notes, %	6.7	6.0	6.6	6.0	6.0	6.1				
	0.0	0.1	-0.1	-0.0	-0.0	0.0				
M2 relative to GNP	0.58	0.59	0.58	0.59	0.60	0.60				
	0.00	0.00	0.00	0.00	-0.00	0.00				
Other Variables										
Real disposable income	1503.7	1522.4	1540.1	1629.9	1731.3	1861.6	1.2	1.2	1.5	1.3
	0.0	-11.0	-16.3	2.1	2.0	1.8	-0.5	0.1	-0.0	0.1
Savings rate, pct	4.0	3.8	3.6	3.3	3.2	3.4				
	0.0	-0.1	-0.4	0.0	0.0	0.0				
Nominal oil price	1.66	1.66	1.74	2.00	2.30	2.64	2.2	2.9	2.8	2.9
	0.00	0.83	0.87	-0.05	-0.06	-0.07	20.3	-3.9	0.0	-2.7

NEW MODEL, LFC UP

Line 1: 3/16/94 noon lsm wkh base #2
Line 2: 3/16/94 12:3p lsm wkh lfc up

Alternatives are shown in deviations from base values.

General Macroeconomic Summary

	1993	1994	1995	2000	2005	2010	93-95	94-05	05-10	94-10
Gross Domestic Product, bil $	6475	6796	7154	8898	10947	13583	5.0	4.3	4.3	4.3
	0	30	23	-16	-30	-41	0.2	-0.1	-0.0	-0.0
Gross Domestic Product, bil 77$	2875	2939	2991	3224	3458	3734	2.0	1.5	1.5	1.5
	0	20	19	13	9	8	0.3	-0.0	-0.0	-0.0
GDP Components, billions 1977$										
Personal consumption	1950	1978	2008	2129	2266	2429	1.5	1.2	1.4	1.3
	0	16	15	11	9	8	0.4	-0.0	-0.0	-0.0
Fixed investment	445	461	467	526	590	656	2.4	2.2	2.1	2.2
	0	8	7	3	1	1	0.7	-0.1	-0.0	-0.1
Inventory change	18	17	16	15	15	16	-6.6	-1.5	1.1	-0.6
	0	1	1	0	-0	-0	2.2	-0.7	0.1	-0.5

Exports	450	471	492	569	633	718	4.5	2.7	2.5	2.6
	0	0	0	1	1	1	0.0	0.0	-0.0	0.0
Imports	471	476	486	535	592	657	1.5	2.0	2.1	2.0
	0	5	4	2	1	1	0.4	-0.1	-0.0	-0.1
Federal government	192	189	187	187	187	187	-1.2	-0.1	0.0	-0.0
	0	0	0	0	0	0	0.0	0.0	0.0	0.0
State & local gov.	312	319	326	353	377	400	2.2	1.5	1.2	1.4
	0	0	0	0	0	0	0.0	0.0	0.0	0.0
				Price Level and Inflation Indicators						
GNP deflator (77=100)	223.8	229.7	237.7	274.3	314.9	362.1	3.0	2.9	2.8	2.8
	0.0	-0.6	-0.8	-1.6	-1.7	-2.0	-0.2	-0.0	-0.0	-0.0
Mfg. Avg Hourly comp	243.7	253.7	262.0	305.0	355.3	413.7	3.6	3.1	3.0	3.1
	0.0	-0.2	-0.7	-1.3	-1.3	-1.4	-0.1	-0.0	0.0	-0.0
Private Labor Productivity	137.7	139.0	139.9	144.4	148.7	153.3	0.8	0.6	0.6	0.6
	0.0	0.2	-0.0	-0.1	-0.1	-0.1	-0.0	-0.0	0.0	-0.0
				Employment Indicators						
Total jobs, mil	125.2	127.2	128.8	136.9	144.7	153.5	1.4	1.2	1.2	1.2
	0.0	1.1	1.2	1.2	1.1	1.1	0.5	-0.0	-0.0	-0.0
Labor force, mil	128.0	129.9	131.8	141.4	150.3	159.5	1.5	1.3	1.2	1.3
	0.0	1.3	1.3	1.4	1.5	1.6	0.5	-0.0	0.0	0.0
Avg weekly hours, Private jobs	35.4	35.3	35.2	34.7	34.2	33.8	-0.2	-0.3	-0.3	-0.3
	0.0	-0.1	-0.1	-0.2	-0.2	-0.2	-0.2	-0.0	-0.0	-0.0
Unemployment rate, %	7.2	6.7	6.3	6.3	6.7	6.5				
	0.0	0.1	0.0	0.1	0.2	0.2				
				Financial Indicators						
Three month T-bills, %	3.8	3.4	4.7	4.2	4.1	4.2				
	0.0	-0.2	-0.2	-0.1	-0.2	-0.2				
10-year Treasury notes, %	6.6	5.9	6.5	6.0	6.0	6.0				
	0.0	-0.1	-0.1	-0.1	-0.1	-0.1				
M2 relative to GNP	0.58	0.59	0.58	0.59	0.60	0.60				
	0.00	-0.00	-0.00	0.00	0.00	0.00				
				Other Variables						
Real disposable income	1503.4	1523.0	1542.7	1629.4	1730.5	1859.4	1.3	1.2	1.4	1.2
	0.0	8.2	10.0	3.8	2.4	1.5	0.3	-0.0	-0.0	-0.0
Savings rate, pct	4.0	3.8	3.6	3.4	3.2	3.4				
	0.0	-0.2	-0.1	-0.1	-0.2	-0.2				
Nominal oil price	1.66	1.66	1.74	2.01	2.30	2.65	2.2	3.0	2.8	2.9
	0.00	0.00	0.00	-0.01	-0.00	-0.01	0.0	-0.0	-0.0	-0.0

NEW MODEL, PRODUCT UP

Line 1: 3/16/94 noon lsm wkh base #2
Line 2: 3/16/94 1:3p lsm wkh prd up

Alternatives are shown in deviations from base values.

General Macroeconomic Summary

	1993	1994	1995	2000	2005	2010	93-95	94-05	05-10	94-10
Gross Domestic Product, bil $	6475	6796	7154	8898	10947	13583	5.0	4.3	4.3	4.3
	0	33	48	-1	-13	-24	0.3	-0.1	-0.0	-0.0
Gross Domestic Product, bil 77$	2875	2939	2991	3224	3458	3734	2.0	1.5	1.5	1.5
	0	48	52	32	27	27	0.9	-0.1	-0.0	-0.1
				GDP Components, billions 1977$						
Personal consumption	1950	1978	2008	2129	2266	2429	1.5	1.2	1.4	1.3
	0	36	37	24	23	23	0.9	-0.1	-0.0	-0.1
Fixed investment	445	461	467	526	590	656	2.4	2.2	2.1	2.2
	0	20	23	10	7	7	2.4	-0.3	-0.0	-0.2
Inventory change	18	17	16	15	15	16	-6.6	-1.5	1.1	-0.6
	0	3	2	0	-0	0	6.1	-1.6	0.1	-1.1
Exports	450	471	492	569	633	718	4.5	2.7	2.5	2.6
	0	2	1	3	2	3	0.1	0.0	-0.0	0.0
Imports	471	476	486	535	592	657	1.5	2.0	2.1	2.0
	0	13	11	5	4	4	1.1	-0.2	-0.0	-0.1
Federal government	192	189	187	187	187	187	-1.2	-0.1	0.0	-0.0
	0	0	0	0	0	0	0.0	0.0	0.0	0.0
State & local gov.	312	319	326	353	377	400	2.2	1.5	1.2	1.4
	0	0	0	0	0	0	0.0	0.0	0.0	0.0
				Price Level and Inflation Indicators						
GNP deflator (77=100)	223.8	229.7	237.7	274.3	314.9	362.1	3.0	2.9	2.8	2.8
	0.0	-2.6	-2.5	-2.7	-2.8	-3.3	-0.5	0.0	-0.0	0.0
Mfg. Avg Hourly comp	243.7	253.7	262.0	305.0	355.3	413.7	3.6	3.1	3.0	3.1
	0.0	1.1	1.6	2.2	2.6	2.9	0.3	0.0	-0.0	0.0
Private Labor Productivity	137.7	139.0	139.9	144.4	148.7	153.3	0.8	0.6	0.6	0.6
	0.0	3.0	2.5	2.3	2.3	2.4	0.9	-0.1	-0.0	-0.0

				Employment Indicators						
Total jobs, mil	125.2	127.2	128.8	136.9	144.7	153.5	1.4	1.2	1.2	1.2
	0.0	-0.3	0.1	-0.4	-0.6	-0.6	0.0	-0.0	-0.0	-0.0
Labor force, mil	128.0	129.9	131.8	141.4	150.3	159.5	1.5	1.3	1.2	1.3
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Avg weekly hours, Private jobs	35.4	35.3	35.2	34.7	34.2	33.8	-0.2	-0.3	-0.3	-0.3
	0.0	-0.0	0.0	-0.1	-0.1	-0.1	0.0	-0.0	-0.0	-0.0
Unemployment rate, %	7.2	6.7	6.3	6.3	6.7	6.5				
	0.0	0.2	-0.1	0.3	0.4	0.4				
				Financial Indicators						
Three month T-bills, %	3.8	3.4	4.7	4.2	4.1	4.2				
	0.0	-0.8	-0.3	-0.2	-0.3	-0.4				
10-year Treasury notes, %	6.6	5.9	6.5	6.0	6.0	6.0				
	0.0	-0.5	-0.3	-0.1	-0.1	-0.2				
M2 relative to GNP	0.58	0.59	0.58	0.59	0.60	0.60				
	0.00	-0.00	-0.00	0.00	0.00	0.00				
				Other Variables						
Real disposable income	1503.4	1523.0	1542.7	1629.4	1730.5	1859.4	1.3	1.2	1.4	1.2
	0.0	16.2	27.2	13.3	9.9	8.2	0.9	-0.0	-0.0	-0.0
Savings rate, pct	4.0	3.8	3.6	3.4	3.2	3.4				
	0.0	-0.5	-0.1	-0.3	-0.4	-0.4				
Nominal oil price	1.66	1.66	1.74	2.01	2.30	2.65	2.2	3.0	2.8	2.9
	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.0	-0.0	0.0

NEW MODEL, OIL SHOCK Line 1: 3/16/94 noon lsm wkh base #2
Line 2: 3/16/94 3:0p lsm wkh oilpr up

Alternatives are shown in deviations from base values.

				General Macroeconomic Summary						
	1993	1994	1995	2000	2005	2010	93-95	94-05	05-10	94-10
Gross Domestic Product, bil $	6475	6796	7154	8898	10947	13583	5.0	4.3	4.3	4.3
	0	-22	-48	9	8	7	-0.3	0.0	-0.0	0.0
Gross Domestic Product, bil 77$	2875	2939	2991	3224	3458	3734	2.0	1.5	1.5	1.5
	0	-16	-20	2	2	0	-0.3	0.1	-0.0	0.0
				GDP Components, billions 1977$						
Personal consumption	1950	1978	2008	2129	2266	2429	1.5	1.2	1.4	1.3
	0	-13	-16	3	1	0	-0.4	0.1	-0.0	0.0
Fixed investment	445	461	467	526	590	656	2.4	2.2	2.1	2.2
	0	-6	-7	0	1	0	-0.8	0.1	-0.0	0.1
Inventory change	18	17	16	15	15	16	-6.6	-1.5	1.1	-0.6
	0	-1	-1	0	0	0	-2.3	0.6	-0.1	0.4
Exports	450	471	492	569	633	718	4.5	2.7	2.5	2.6
	0	-0	-0	-1	-0	-0	-0.0	0.0	0.0	0.0
Imports	471	476	486	535	592	657	1.5	2.0	2.1	2.0
	0	-5	-5	1	0	-0	-0.5	0.1	-0.0	0.1
Federal government	192	189	187	187	187	187	-1.2	-0.1	0.0	-0.0
	0	0	0	0	0	0	0.0	0.0	0.0	0.0
State & local gov.	312	319	326	353	377	400	2.2	1.5	1.2	1.4
	0	0	0	0	0	0	0.0	0.0	0.0	0.0
				Price Level and Inflation Indicators						
GNP deflator (77=100)	223.8	229.7	237.7	274.3	314.9	362.1	3.0	2.9	2.8	2.8
	0.0	0.6	0.0	0.1	0.1	0.1	0.0	-0.0	-0.0	-0.0
Mfg. Avg Hourly comp	243.7	253.7	262.0	305.0	355.3	413.7	3.6	3.1	3.0	3.1
	0.0	0.1	0.2	-0.3	-0.1	-0.0	0.0	-0.0	0.0	-0.0
Private Labor Productivity	137.7	139.0	139.9	144.4	148.7	153.3	0.8	0.6	0.6	0.6
	0.0	-0.2	-0.1	0.1	0.0	0.0	-0.0	0.0	-0.0	0.0
				Employment Indicators						
Total jobs, mil	125.2	127.2	128.8	136.9	144.7	153.5	1.4	1.2	1.2	1.2
	0.0	-0.4	-0.5	0.0	0.0	0.0	-0.2	0.0	-0.0	0.0
Labor force, mil	128.0	129.9	131.8	141.4	150.3	159.5	1.5	1.3	1.2	1.3
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Avg weekly hours, Private jobs	35.4	35.3	35.2	34.7	34.2	33.8	-0.2	-0.3	-0.3	-0.3
	0.0	-0.0	-0.1	-0.0	0.0	0.0	-0.1	0.0	-0.0	0.0
Unemployment rate, %	7.2	6.7	6.3	6.3	6.7	6.5				
	0.0	0.3	0.4	-0.0	-0.0	-0.0				
				Financial Indicators						
Three month T-bills, %	3.8	3.4	4.7	4.2	4.1	4.2				
	0.0	-0.0	-0.3	-0.1	-0.0	-0.0				
10-year Treasury notes, %	6.6	5.9	6.5	6.0	6.0	6.0				
	0.0	0.1	-0.0	-0.0	-0.0	-0.0				
M2 relative to GNP	0.58	0.59	0.58	0.59	0.60	0.60				
	0.00	0.00	0.00	-0.00	0.00	0.00				

				Other Variables						
Real disposable income	1503.4	1523.0	1542.7	1629.4	1730.5	1859.4	1.3	1.2	1.4	1.2
	0.0	-12.2	-18.3	1.5	0.9	0.3	-0.6	0.1	-0.0	0.1
Savings rate, pct	4.0	3.8	3.6	3.4	3.2	3.4				
	0.0	-0.1	-0.3	-0.0	0.0	-0.0				
Nominal oil price	1.66	1.66	1.74	2.01	2.30	2.65	2.2	3.0	2.8	2.9
	0.00	0.83	0.87	-0.05	-0.06	-0.07	20.3	-3.9	-0.0	-2.7